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The early stages of some African Lycaenidae (Lepidoptera), with an account of the larval habits. By T. H. E. Jackson, F.R.E.S.
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THE EARLY STAGES OF SOME AFRICAN LYCAENIDAE (LEPIDOPTERA), WITH AN ACCOUNT OF THE LARVAL HABITS

By T. H. E. Jackson, F.R.E.S.

(With an introduction by G. Talbot, F.R.E.S.)

[Read 5th May, 1937.]

1. Introduction.

Mr. Jackson has asked me to communicate this paper to the Society, and it seems necessary to give some general idea of its scope including some bionomic notes communicated later by the author.

The fascinating theory of Mimicry, however one may regard it, as expounded by Sir Edward Poulton, has stimulated many young and able men in our colonies and elsewhere to investigate insect bionomics; and this has had important scientific results. Those who have come under his influence and shared his enthusiasm owe much to Poulton, and among them are the three investigators mentioned in this introduction.

It is well known that the larvae of many species of the family Lycaenidae pass their existence attended by ants, either within the ant nest or upon a plant frequented by ants. Our first information concerning these and other curious habits of the African species was due to Dr. W. Lamborn, who bred a great number of Lycaenidae in Southern Nigeria. His observations formed the subject of a brief communication to the Society by Dr. Lamborn and Professor Poulton in 1911, and were recorded in the *Proceedings* for that year; they were afterwards embodied in an important paper by Dr. Lamborn in the *Transactions* for 1913. The work was carried a stage further by the late C. O. Farquharson, also in S. Nigeria, who discovered that at least one species (*Lachnocnema bibulus*) fed upon living Membracids and Jassids. Farquharson's paper, with illustrations and descriptions by Dr. H. Eltringham, appeared in the *Transactions* for 1924.

These two pioneers in the bionomics of African Lycaenidae are now followed by T. H. E. Jackson, who, in Kenya and Uganda, has been breeding the species found there, and carefully recording his observations.

More exact knowledge of the early stages and larval habits of the Lycaenine species may help to show how far our generic distinctions hold good. Mr. Jackson finds, for instance, that the species known as *Phlyaria heritsia* and *P. cyara* are extremely different in their early stages, and to such a degree that he considers *heritsia* would be better placed near *Castalius margaritacea*.

Sets of the bred material, including ants, parasites, pupae, and larvae, have been presented by Mr. Jackson to the British Museum, and to the Hope Department of Entomology at Oxford.

I am responsible for checking the determinations of Lycaenidae. The ants were determined by Mr. H. St. J. K. Donisthorpe, and by Dr. F. Santschi of Kairouan, Tunisia. The Hymenopterous parasites were determined by Mr. J. F. Perkins.

Mr. Jackson desires to express his sincere gratitude to Sir Edward Poulton,

F.R.S., and to Professor G. D. Hale Carpenter, to whose help and encouragement he feels that he owes a great deal. It is also a pleasure for him to thank members of the Entomological Department of the British Museum, especially Mr. N. D. Riley (Keeper), and Messrs. H. St. J. K. Donisthorpe and J. F. Perkins, for their valued assistance.

Following is an account of the general bionomics of the LYCAENIDAE including notes by Mr. Jackson not given in the main body of the paper.

Ant Association.

Of the 58 LYCAENIDAE dealt with in this paper seven are so intimately associated with ants that they cannot live without them. These are *Liptena undina* S. & K., *Aphnaeus*, *Spindasis*, *Chloroselas*, *Anthene wilsoni* (Talb.), *A. levis grisea* (Talb.) and *A. nigeriae* (Auriv.). There are 25 other species which also possess tubercles and glands, and are therefore presumed to be ant-attended, although this was not always observed. These belong to the genera *Iridana*, *Deloneura*, *Deudorix*, *Virachola*, *Myrina*, *Axiocerses*, *Anthene* (= *Lycaenesthes*), *Phlyaria*, *Uranothauma*, *Castalius*, *Azanus*, *Syntarucus*, *Cosmolyce*, *Cyclirius* and *Euchrysops*. Among these genera are a few species in which neither tubercles nor glands are present, and such are not regarded as being ant-attended, even though the larva may live in the ants'-nest.

Mr. Jackson believes that when a larva is merely *attended* by ants, the species of ant is immaterial. " With the leaf-eaters, where the attendant ant is possibly merely protective, I find that in each case any ant will do. I've tested them in pill-boxes and several species will drink from the gland, while in the field I've found different species actually in attendance in many cases. So that although some of my specimens have only one ant actually sent with them, it is probable that the other common ants also attend them."

The Larval Gland and Tubercles.

These organs are situated on the posterior segments and consist of a pair of minute eversible tubercles and a gland. The tubercles are placed on either side of and slightly posterior to the gland. Each tubercle is fine and thread-like and bears at its apex a rosette of minute spines which can be withdrawn into the stalk. When ants are present the tubercles are immediately protruded, and the ants are at once attracted to the spot. It is probable, therefore, that a scent is given off from the terminal spines, highly attractive to ants in order to bring them to the gland. " The organs vary in different species, both in themselves and in the manner of their use. In a few cases the gland is even a danger, as, if the secretion is not removed regularly, a mould appears and the larva soon dies. This may happen to *Anthene nigeriae* (Auriv.), and *Aphnaeus hutchinsoni drucei* Neave. The former species and the *Chloroselas* seem to carry a second gland under the collar between the second and third segments, and are protected here by hard chitinous plates."

Larval Habits and Food.

Mr. Jackson has discovered that one species (*Aslauga purpurascens* Holl.) feeds upon living Membracids, and that three species feed upon lichen. He also found that *Lachnocnema bibulus* (Fbr.) in this area did not eat Membracids but fed upon the secretion from their honey-gland, Jassids also being similarly

attended. In the case of species which spend the entire larval stage in the ants'-nest, the nature of the food taken has not been exactly ascertained. Mr. Jackson suggests, with much probability, that such larvae feed upon fungi cultivated by the ants; so far it has not been possible to prove that this is actually the case, and Mr. Jackson proposes to carry out some experiments to this end. The larva of *Spalgis lemolea* Druce feeds upon Coccids, and that of *Cyclirius* in a root below ground. Mr. Jackson notes: "Bark, lichen, the leaves, stems, fruit, and even the roots of plants of widely different groups are all utilised by members of the family, and no plant seems to be immune through thorns, poisonous juices, the hardness of its leaves, or through any other form of plant protection."

Larval Parasites.

"The LYCAENIDAE seem to be controlled by parasites neither more nor less than any other family, and while one species would appear to be almost immune one season, the next would see it heavily attacked. Most of these parasites are Hymenoptera. Their larvae are so small that the parasite goes on feeding into the pupal stage of the host and emerges from the perfect pupa. It is, therefore, a fairly safe test to collect many pupae and watch the results. In the case of *Spalgis lemolea* Druce no parasites emerged, and with *Aphnaeus hutchinsoni drucei* Neave no success has attended efforts to breed parasites in the tunnels of the ants, nor with *Anthene wilsoni* (Talb.) in the nests, both very good examples of the effectiveness of ant protection. With these exceptions all are equally attacked, although it would seem that flower feeders are more susceptible than fruit feeders, possibly because the female parasite would be normally attracted to the flowers for food. For several years small batches of the larvae of *Cacyreus lingeus* (Crm.) have been bred here, feeding on Labiates of many species and always on the flowers. In spite of their very wonderful protective colouring, of every shade of pink, purple and green, over 50 per cent. and sometimes as much as 90 per cent. are parasitised. It is quite obvious that without some form of protection, such as the above, a much harried species, like *C. lingeus*, would soon cease to exist. On the other hand, firstly, the example is one of the commonest species of the Labiatae, a very numerous order of plants in East Africa, largely protected from herbivorous animals by powerful and unpleasant scents; and secondly, almost every plant when examined will be found to bear eggs of the butterfly. It would appear, therefore, that some very efficient form of parasite would be necessary to keep the species under control."

Mr. Jackson sent to the British Museum a number of Hymenoptera and some Tachinid flies. Mr. Perkins has determined the former to belong to the genera *Charops*, *Anilastus*, *Neotypus*, *Mesochorus* and *Itoplectis* (ICHNEUMONIDAE), *Apanteles* (BRACONIDAE), and *Brachymeria*, and *Tetrastichus* (CHALCIDIDAE). These are noted with their respective hosts in the second part of the paper. As yet it has not been found possible to determine the Tachinids which were bred from 9 species, but the material is available for study at the British Museum.

The Pupal Stage.

"After many experiments carried out here, and the collecting of much data, it became apparent that no useful information would be gained by recording the time taken in the pupal stage of each species. It is entirely a question of weather, the deciding factor being probably the atmospheric humidity combined

with the temperature and light. During very dry weather emergence is retarded and only takes place after a shower of rain or if moisture is introduced into the breeding-cage. Given normal wet weather conditions, about 10–14 days is the usual period. The very critical stage in the life-history, when the wings are "growing" and drying after emergence, is in the LYCAENIDAE incredibly short. In 2 or 3 minutes after emergence the wings are fully expanded and the insect is ready for flight. Emergence takes place between 9 and 12 a.m., very seldom later than this, and usually between 9 and 10 a.m., in time, therefore, for the morning flight. With pupae in a breeding-cage indoors and not near a window, the time of emergence varies very little from that stated above, and it would seem from this, assuming the temperature of room and cage to be more constant than the open air, that light is the factor that governs emergence.

"In the case of *Stugeta olalae* Stoneh. and *Argiolaus pallene* Wllgr. the time passed in the pupal stage is very long, as long as 6 months in some cases here. The reason probably is that both species inhabit very dry country where the veldt is burnt annually, thereby temporarily destroying the food-plant. It seems likely, therefore, that the insects remain in the pupa until the advent of the next rains when the food-plant is in foliage again."

Protection Against Ants.

Species which pass the larval stage within the nests of ants, and even emerge from a pupa formed there, require some protection from attack. One of these is *Anthene wilsoni* (Talb.), in which, strangely enough, neither tubercles nor gland are present. "The larva of this species relies entirely upon a thick leathery skin for protection. The imago, after emerging from the pupa, has to proceed to daylight along the ant tunnels, and the immunity which it enjoys from attack by the ants is probably due to the thick hair covering the legs and under parts of the body. Hair seems to be always a protection from ants, one very good example being the larva of *Deloneura ochrascens* (Neave). This larva is entirely clothed in spiny black hair, and its general appearance is very like that of many Lymantriid moths. The ants leave it entirely alone although it lives in and about the entrances of the tunnels and ant-runs."

Protective Coloration and Resemblance.

Larva.—"The larvae are often coloured to resemble the leaf on which they are feeding. *Anthene larydas* (Cram.) on *Albizzia gummifera*, may be either green, red or pink, according to the colour of the foliage. *Anthene livida* (Trim.) feeds on the flowers of various species of *Kalauchoe* which may be either orange or yellow, and the larva is coloured accordingly. The larva of *Aslauga purpurascens* Holl. resembles lichen or moss, and that of *Cacyreus lingeus* (Cram.) resembles a Labiate flower. The larva of *Argiolaus silas crawshayi* Butl. is rendered practically invisible by a covering of down from the shoots of the food-plant in which it burrows."

Pupa.—"The pupa of *Epamera sidus* (Trim.) resembles the berry-like fruit of the food-plant, the resemblance being increased by a stalk-like attachment. The pupa of *Epamera tajoraca haemus* Talb. represents a piece of dead lichen-covered bark, sometimes black and sometimes with the grey-green mottling of lichen, and with all the irregularity of contour associated with dead twigs and bark. Such pupae are placed in exposed situations. Pupae which are without any special procrypsis are invariably well hidden in seed pods, among

dead leaves or under bark. In the case of *Anthene wilsoni* (Talb.) which lives in the nests of ants, a cocoon is formed of the nest detritus cemented firmly together so as to be impenetrable to the ants. *Aphnaeus hutchinsoni drucei* Neave closes both ends of a tunnel in deadwood with hard ligneous material, and pupates in the resultant chamber much as a Sesiid moth."

Imago.—Apart from the many well-known examples of mimetic resemblance and procryptic coloration furnished by the African LYCAENIDAE, one interesting fact may be mentioned here.

"It has been recorded by Farquharson and others that some species display false direction marks soon after emergence from the pupa. This is the case with most of the *Argiolaus* and *Epamera* bred by me. Directly the wings are fully expanded the insect rests motionless with closed wings, the hind-wings carried well above the body. The tail appendages common to the genus are then displayed, the tails branching out diagonally from the wings and the basal lobes raised to a horizontal position below them on either side, forming a very good imitation of the head and antennae of the insect. If a predator appears before the wings are dry enough for flight, it may be puzzled as to which end to attack, and seizing the false head will merely tear away the anal part of the wing and the insect may escape."

2. DESCRIPTIONS AND HABITS.

(The number in parentheses following the name of each species is the original number applied to the specimens by Mr. Jackson.)

LIPTENINAE.

The following series (Nos. 1–6, 8, 9, and 11) are all to be found both in the larval and pupal stages on the trunks of trees. Some few are associated with ants, the majority for purposes of protection only, but others are probably more closely connected, living among the ants and feeding perhaps on fungi grown by their hosts; the greater part, however, are lichen feeders.

Many wonderful colour adaptations are present, some representing lichen and others the larvae of moths, etc., the former being procryptic and the latter in most cases aposematic since they mimic hairy stinging models. The whole life-history is passed on the bark.

The perfect insects are not uncommon in most cases, but, unless their habits are known, are seldom seen. They are very retiring in habit, flying early in the morning and again in the evening from 4 p.m. to 5 p.m. or during a dull afternoon when the females may be seen laying their eggs on dead twigs and trunks of trees. A favourite habit is to sit at the extreme end of a twig with wings folded, showing the usually procryptic underside, and they are often found feeding on secretions from plant glands on the young tendrils of creepers, etc., or among Membracids. Nearly all are mimetic of other insects, Acraeas, Pierines, etc. The ants concerned in all cases belong to a species of *Crematogaster*.

1. *Telipna consanguinea* Rebel (52).

Telipna consanguinea Rebel, 1914, *Ann. Hofmus. Wien*, **28** : 262, f. 39, 41.

Food. Lichens and mosses on the bark of trees, not among ants.

Larva. The larva is clothed sparsely with long brown hair and is indis

tinguishable from that of a moth. It is broader anteriorly with a fine dark dorsal line and small black collar. The laterals are sharply scalloped, carrying tufts of short spiny hair, as well as the longer hair mentioned above. The colour is greenish or bluish-brown with fine darker lines and the anal segments black like the collar. Spiracles small and greenish, and below them a row of minute white dots. Head small and pale brown. Length, 30 mm.

Pupa. The pupa is placed with the extremity, surrounded by the larval skin, fixed to the trunk of the tree, standing out from it at an angle of 45°. It is quite unlike any other Lycaenid pupa I have yet seen, being similar to those of the NYMPHALIDAE, especially *Atella phalantha* (Drury). It is spiny, the spines being arranged in rows of rosettes laterally, ventrally and dorsally. Thorax sharply domed, the two sides of the dome bearing large oval spots, so highly polished as to resemble obsidian. Seen at certain angles they glitter and sparkle like eyes and at others suggest large holes in the thorax. The head-case is broad and carried well in front. Colour brown; wing-cases shiny; without spines. The pupa has no external protection whatsoever and, except that it is usually placed in a dark place behind a creeper, there is no attempt at concealment. Length, 16 mm.

Locality. Budongo Forest, Uganda.

2. *Telipna sanguinea depuncta* Talb. (53).

1937, *Trans. R. ent. Soc. Lond.*, **86** : 59 (♂♀).

There is no apparent difference between the early stages of this and of the preceding species except that the larval hair is here more golden brown and slightly longer.

Locality. Budongo Forest, Uganda; also from Katera, Malabigambo Forest, about 10 miles from mouth of Kagera River, near the Tanganyika border, 4000 feet.

3. *Pentila muhata* Dew. (58).

Pentila muhata Dewitz, 1886, *Deuts. ent. Z.*, **1886** : 428, t. 2, f. 6, 6a.—Aurivillius 1914, *in* Seitz, *Macrolep. World*, **13** : 311, t. 61i.

Food. Lichens, preferring the smaller varieties on dead twigs and fallen logs.

Larva. In shape like a silver-fish (Thysanura), being broadly rounded anteriorly and tapering to a sharply pointed posterior extremity. Each segment carries three or four black spines. Dorsum irregularly rounded and head protected by a collar from which it is never extruded even when feeding. In colour green, grey and black exactly resembling the lichen on the tree. Length 15 mm.

Pupa. As in the larval stage spiny, although here the spines are single and whitish and arranged in rows of five across each segment. The head case is black with prominent white eye-spots; the thorax small, but elevated, and beyond it a depression, and up to this point the colour is light brown. Thereafter the abdominal segments are on a higher level, roughly rounded and broader, coloured pale green. The larval skin is placed around the extremity in a small, bunched up, spiny circle. Wing-cases jet black; placed in a horizontal, arched position on the bark. Length, 8 mm.

Locality. Budongo Forest, Uganda.

4. *Mimacraea krausei poultoni* Neave (55).

Mimacraea poultoni Neave, 1904, *Nov. Zool.*, **11** : 337, pl. I, f. 18.—Aurivillius, 1918, *in* Seitz *Macrolep. World*, **13** : 316.

I am unable to discover any differences whatever between the larva and pupa of this form and the form *masindae* B.-B.

Egg. Circular, hemispherical, and dirty yellowish-white with the surface minutely ornamented with a network pattern and a small black central spot. Laid among lichen on bark. Very small for the size of the insect : diameter, 0·5 mm.

Locality. Busia, Uganda.

5. *Mimacraea krausei masindae* B.-B. (54).

Mimacraea masindae Beth.-Baker, 1913, *Ann. Mag. nat. Hist.* (8) **11** : 565 (Budongo Forest).—Aurivillius, 1918, *in* Seitz *Macrolep. World*, **13** : 317.

Food. As in the case of the two species of *Telipna*, the larva feeds on lichens and moss on the trunks of trees and is not found among ants.

Larva. The larva is dark sepia brown, almost black with long blackish hair, sparsely covering it and allowing the shiny skin and segment rings to appear. Head very small and unprotected, the whole moth-like and very like the larvae of some Lithosiids. Length, 26 mm.

Pupa. Placed flat on the bark, the larval skin enfolding the last few segments; usually among moss. It is dark blackish-brown with short thick hair carried transversely across each segment, the divisions being free and an occasional longer hair here and there. It is capable of movement from side to side. Very broad, but without irregularities. Length, 17 mm.; breadth, 7 mm.

Locality. Budongo Forest, Uganda.

6. *Liptena undina* Smith & Kby. (57).

Liptena undina Smith & Kirby, 1894, *Rhop. Exot.*, **29**, Lycaen. Afr. : 117, pl. 25, f. 6, 7.—Aurivillius, 1918, *in* Seitz *Macrolep. World*, **13** : 334, t. 63k.

Food. The larva is very closely associated with ants and will not feed up in captivity.

Larva. The larva is small, regularly formed dark sepia and hairy, each hair terminating in a white, bulbous filament. Head very small, but unprotected by a collar. Length, 11 mm.

Pupa. As in the larva dark brown, with the same brown, white-tipped hair. It is well hidden under bark and near the ant-runs. Length, 9 mm.

Locality. Budongo Forest, Uganda.

7. *Aslauga purpurascens* Holl. (36).

Aslauga purpurascens Holland, 1890, *Psyche* **5** : 424.—Aurivillius, 1920, *in* Seitz *Macrolep. World*, **13** : 343, t. 64c.

Food-plant. Usually found in my experience on *Acacia stenocarpa* Hochst., Mimosaceae, where it feeds on Membracids. Being carnivorous it is not easy to breed in captivity, and if at all starved will devour other larvae of the same or similar species such as *L. bibulus* F. When catching a Membracid it will move quietly nearer until close enough, when the anterior portion of the carapace is slightly raised and lowered again over the victim.

Egg. The egg is laid flat on the leaflets at the extreme tips of the branches

near a colony of Membracids. It is very small, white, and oval with slight central depression less than 0·5 mm. long.

Larva. In shape something like a limpet shell, and coloured in mottled greys and greens to represent lichen or moss on bark. The skin is rough and leathery, the carapace being extraordinarily heavy, completely protecting the legs, head and ventral portion. The outline of the carapace is nearly oval with slight central indentations; from here on all sides, especially from the front, it slopes very abruptly upwards to a broad dorsal ridge, 2·5 mm. in breadth and centrally depressed. At the extreme posterior end of the ridge are two small external tubercles. The head is small and black, and is protruded when feeding or moving from under the carapace similar to that of a tortoise. I have never seen the tubercles exserted.

Pupa. The pupa is brown mottled with black and is placed flat on bark or under it, and attached by the posterior extremity. The abdominal segments are very broad and contracted, sloping very sharply to the posterior extremity and more gradually to the head case. Thorax slightly ridged and shoulders rather prominent, the pupa as a whole being squat and roughly oval in outline. At *each* extremity low down on the lateral surfaces are small depressions one on each side like eye-spots, and coloured black which, together with a small black line above the head case and a black spot in the centre of the posterior stalk, gives a very good impression of another insect when looked at from above.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March, 1933.

8. *Iridana incredibilis* Stgr. (51).

Iridana incredibilis Staudinger, 1891, *Deuts. ent. Z.* '*Iris*,' **4** : 141.—Aurivillius, 1920, *in* Seitz *Macrolep. World*, **13** : 345, t. 65c.

Early stages: Farquharson, 1921, *Trans. ent. Soc. Lond.*, **1921** : 357–358 (larva on *Alstonia congensis*).—Eltringham, 1921, *Trans. ent. Soc. Lond.*, **1921** : 477, pl. XII, f. 6, 10 (pupa) (S. Nigeria).

Food. In habits it is similar to *I. marina*, but it spins a thick white covering quite unlike the other as protection from attacks by ants.

Larva. Very like that of *I. marina*, but lacking the french-grey ground-colour, which is here duller and blacker; otherwise it does not differ.

Pupa. The pupa on the other hand is very different. It is placed in its thick white puparium, right in the ant-runs in a crack of the bark. Brown, with broad domed thorax covered in short fine hair, abdominal segments regularly formed. The larval skin is curled up over the extremity. Length, 11–12 mm.

Locality. Busia, Uganda.

9. *Iridana perdita marina* Talbot (50).

Iridana perdita marina Talbot, 1935, *Ent. mon. Mag.*, **71** : 74 (Uganda).

Food-plant. The larva probably feeds on lichens among ants, apparently at night, since by day it is found with a light silken covering over it, in a crack of the bark. It was raised in captivity without ants.

Larva. Hairy and very moth-like. It is coloured french grey with three dark brown transverse bars, one centrally and one at each extremity, and in addition the posterior half has a dark, broad dorsal line. The extreme lateral edges are whitish, above which is a broad, greyish-black longitudinal line, followed by french grey, and there is a suggestion of orange-brown at the base of the hair. The whole clothed in long greyish hair. Length, 21 mm.

Pupa. Enclosed in the same thin silken covering as used by the larva;

it is placed among moss or lichen, near the ant run. The pupa itself is brown and hairy, the hair along the laterals being arranged in thick symmetrical tufts. Thorax small and oval, followed by a waist; the abdominal segments being also oval it resembles a badly formed figure 8. The hairy larval skin is arranged in a long untidy rosette around the posterior extremity. Length, 11 mm.

Locality. Budongo Forest, Uganda.

10. *Deloneura ochrascens* (Neave) (35).

Poultonia ochrascens Neave, 1904, *Nov. Zool.*, **11** : 336, pl. I, f. 13.—*Deloneura ochrascens.* Aurivillius, 1920, *in* Seitz *Macrolep. World*, **13** : 347.

Food-plant. The larva is found on the bark of *Acacia stenocarpa* Hochst., Mimosaceae, among ants.

Egg. The egg is a most complicated object. It is large, fully 1 mm. in diameter, circular, and much flattened. It consists of a flat outer ring embossed with symmetrical rays, and a slightly elevated circular inner portion with a small black central spot. It is stone grey or brownish-grey, and is laid singly among the lichen or in the fissures of the bark.

Larva. Black, with very long black hair, strongly reminiscent of the larvae of certain Lymantriids. In the early stages the dorsum is lighter, mottled and streaked with black, with broad black bars on segments 2, 4 and 10. Head small and black, thoracic segments somewhat broader, tapering thence to the anal extremity, with long lateral fringes of hair. Tubercles and gland not present. Length, 25 mm.

Pupa. The pupa is placed usually on the outside of the bark or in cracks, fissures, etc.; it is cryptically coloured in black or grey. The posterior portion is surrounded ventrally by a rosette of long blackish hair, being the old larval skin, the pupa itself being also hairy. In shape, starting from the posterior extremity, it becomes gradually broader with a broad dorsal ridge and three lateral wart-like processes; about the centre of the wing-cases is a "waist" more prominent dorsally than laterally. Head-case very prominent with a dorsal ridge. There is a heavy black dorsal line and a jet black transverse streak across the first abdominal segment. It is placed flat on the bark and attached by the posterior extremity to a silk-covered patch.

Note on possible food. The larva is found sometimes near the entrances of the ant tunnels or sometimes in a crack of the bark, but always close to or among the ants. Bark is probably eaten, but it will not feed up on this in captivity. Nevertheless, it still seems the most likely food, and possibly some small fungus or lichen on the bark is sought after. The larva takes no notice of the ants, nor they of it, in fact the ants appear deliberately to avoid it. An examination of the mouth-parts and of the excreta might help to determine what its probable food is.

The ant associated is *Crematogaster* (*Acrocoelia*) *castanea* Smith var. *tricolor* Gerst.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, Sept., 1932.

11. *Hewitsonia kirbyi intermedia* J. & T. (56).

Hewitsonia kirbyi intermedia, Joicey & Talbot, 1921, *Bull. Hill. Mus.*, **1** : 86, ♀ (Ituri).—Hawker-Smith, 1928, *Rev. Zool. Afr.*, **16** : 215, ♂ (Congo).

Food. Lichen on the trunks of trees, preferring apparently the smaller types, since it is found usually on clean smooth bark where its coloration is very effective.

Larva. The larva resembles the larva of certain Lymantriids, and both can usually be found on the same tree, so that it requires quite a close examination to distinguish the two. It is whitish and light brown with a complicated diamond-chain design on the dorsum. Broader anteriorly, but tapering only slightly from here. The dorsum is smooth, but the sides and extremities are fringed with long fine hair, spread horizontally on all sides, and interspersed at each segment with thicker shorter filaments of a light brown silky appearance. Head large, black and unprotected. Length, 30 mm. and over.

Pupa. Flat on the bark, and unprotected except for its procryptic colouring, placed usually behind creepers or beneath an overhanging log. It is attached by the posterior extremity with the hairy larval skin arranged in a neat flat rosette around it. The abdominal segments are broad and shield-shaped, slightly ridged dorsally and spiny, especially along the lateral edges, thence with deeply incised shoulders and a broad and domed thorax. The head-case is protected by a broad shovel-shaped collar above, the actual appendages being carried ventrally and completely hidden. Wing-cases also ventral or nearly so, and smooth. The colouring is lichen-like in greys and greens with black speckling. **Length, 17 mm.; breadth, 9 mm.**

Locality. Budongo Forest, Uganda.

Lycaeninae.

12. *Lachnocnema bibulus* (F.) (42).

Papilio bibulus Fabricius, 1793, *Ent. Syst.*, **3** (1) : 307.—*Lachnocnema bibulus* Aurivillius, 1923, *in* Seitz *Macrolep. World*, **13 : 363, t. 65g.**

Early stages : Farquharson, 1921, *Trans. ent. Soc. Lond.*, **1921** : 388 (larva feeding on secretion of immature ant-attended Membracids, and on living Membracids and Jassids).—Eltringham, 1921, *Trans. ent. Soc. Lond.*, **1921** : 483, pl. XIII, f. 21 (pupa) (S. Nigeria).—Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 470 (larval habits) (S. Nigeria).

Food-plants. It is found on many species of tree or shrub, in fact wherever Membracids or Jassids are present. The larva feeds on the secretion provided by the immature stages of the above, and the process is interesting. The fore-legs are much modified, being long, crab-like and capable of extended movement. Sitting back on its abdominal segments, the forepart of the body is raised over the anal tube of the Membracid, the fore-legs are then vibrated rapidly over the insect, just in the same way as an ant strokes certain larvae with its antennae, when a drop of the secretion promptly appears and is greedily devoured. I have never seen a Membracid actually eaten.

Egg. The eggs are orange when freshly laid, small, circular, flattened, and strongly indented centrally above. They are laid among colonies of Membracids or Jassids but not in my experience among Coccids, the ♀ often pausing with abdomen raised away from the ants to feed on the secretion left on the stems or leaves.

Larva. The larva is first red with black head, later brown. The dorsum is curved evenly from the anal extremity upwards and then down again, the head centrally very broad. Both collar and lateral carapace are present, the latter having scalloped edges. Dorsally there are rows of warts carrying long hair. Head black and small.

Pupa. I have not seen the pupa of this species.

Parasites. A Tachinid was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March, 1930.

Ants. The following ants were sent with this species, though their relation to the Lycaenid is not mentioned by Mr. Jackson [G.T.]. *Crematogaster*

(*Sphaerocrema*) *phoenix* Sants.: *Crematogaster* (*Acrocoelia*) *castanea* Smith. st. *inversa* For. var. *elonga* Sants.: *Catavlaeus domisthorpi* Sants.: *Myrmicaria opaciventris* Em. var. *obscuripes* Sants.

13. *Deudorix dinochares* Gr. Sm. (46).

Deudorix dinochares Grose Smith, 1887, *Ann. Mag. nat. Hist.* (5) **19** : 64.—Aurivillius, 1921, *in* Seitz *Macrolep. World*, **13** : 374, t. 66d.

Food-plant. The larva feeds on the fruit of *Syzygium cordatum* Hochst., ex Harv., Myrtaceae. It bores inside the fruit and emerges only to pupate or when the fruit is a mere hollow shell.

Egg. The egg is laid in the depression in the top of the fruit: it is large, fully 1 mm. in diameter, and white. In shape, it is circular at base and evenly domed, with no central depression.

Larva. The larva is very similar to that of *Deudorix antalus*, being bluish-grey, with the warts present as in that species.

Pupa. The pupa also is like that of *D. antalus*. As in the case of the larva, it is practically indistinguishable and neither require further description.

Parasites. Two species of *Neotypus* (Hymen., ICHNEUMONIDAE) were bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, June, 1934.

14. *Deudorix antalus* Hpffr. (41).

Deudorix antalus Hopffer, 1855, *MonBl. Akad. Wiss. Berl.* **1855** : 641.—Aurivillius, 1921, *in* Seitz *Macrolep. World*, **13** : 375, t. 66e.

Food-plant. The larva feeds in the seed pods on the immature seed of *Acacia stenocarpa* Hochst., Mimosaceae: also in pods of *Dolichos lablab* (Linn.), Papilionaceae.

Egg. The eggs are a beautiful clear pale green, circular at the base, about 0·5 mm. in diameter, evenly domed and with a small dark central spot. They are laid near the junction of the seed pods and their stalks, either singly or in pairs.

Larva. The larva is chocolate brown with longitudinal rows of black warts carrying indigo blue hair, one row along the dorsum and two along each lateral. The collar is larger than usual, since both the first and second segments are broadened and hood-like and spotted with indigo and yellow. The shape is grub-like, broad and rounded dorsally, the head small and black. The anal segments are flattened and hairy; they possess two minute white tubercles placed close together with the gland centrally above them. Length, 20 mm.

Pupa. The pupa is placed among the bark, in cracks or under loose pieces, and fastened by a silk sling. It is dark brown with black dorsal line and wing-cases, of nearly even width throughout, broader than usual, with more prominent head-case and a slight "waist" midway. Length, 10 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, April, 1933.

15. *Virachola jacksoni* Talbot (15).

Virachola jacksoni Talbot, 1935, *Ent. mon. Mag.*, **71** : 206, pl. IV, f. 2, 3 (Uganda, Kenya).

Food-plant. The larva feeds on the young leaves of *Loranthus usuiensis* Oliv., Loranthaceae.

Egg. Not known.

Larva. The larva is dark rich brown, with a patch on the dorsal region

of segments 2 and 3 much lighter brown, surrounded by a square of black. It is covered with short black spiny hair. The segments are strongly incised, and along the sides are rows of deep, pit-like depressions. The shape is slug-like, tapering from the centre to both extremities, the dorsal region being broad but not markedly ridged. Collar heavy, and spiracles plainly visible and black. Thin, short tubercles are present on the anal segments, half-way between the centre and the edges; they are exserted vertically, and above them is a gland with an oval deep-seated orifice. Length, 20 mm.; breadth, 6 mm.

Pupa. The pupa is broad and foreshortened, brown with a black dorsal line and heavy black lateral markings. Head-case broad and rounded, thorax also broad and evenly curved, with a slight depression between it and the abdominal segments. It is placed flat on a leaf, the surface of which has been previously cleaned and smoothed, and another leaf drawn down over the top by silk threads. Length, 10 mm.; breadth, 6 mm.

Parasites. Tetrastichus sculpturatus Waterst. (Hymen., CHALCIDIDAE) was bred.

Locality. Kenya: Trans Nzoia, August, 1933.

16. *Myrina silenus* (F.) (33).

Papilio silenus Fabricius, 1775, *Syst. Ent.* : 531.—*Myrina silenus* Aurivillius, 1922, *in* Seitz *Macrolep. World*, **13** : 378, t. 68a.

Early stages: Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 472 (ant-attended larva) (S. Nigeria).—Lamborn and Poulton, 1911, *Proc. ent. Soc. Lond.*, **1911** : xcix–c.

Food-plant. The larva feeds on the young shoots of *Ficus ingens* Miq., Moraceae, and other figs.

Egg. The egg is circular and white, with a pretty network pattern over the surface. It is evenly domed, with a small central black spot. More than 1 mm. in diameter. It is laid on the tips of the unopened shoots.

Larva. About 1·5–2 mm. long on emergence, it is posteriorly yellowish-green and anteriorly brown. The dorsum is at first flattened, rising at segment 4 to a hump, then of even height, and corrugate to the ninth segment, finally a broad shield as at the posterior extremity. Segments 4, 8, and 9 are larger and thicker than the rest and reddish-brown. When full grown the ground-colour is green, the intersegmental regions deeply incised, each individual segment being triangular with the exception of the three thoracic ones, which are square and double ridged. Segment 4 is large, triangular, and red; segment 7 smaller, but also red; segments 8 and 9 very much enlarged, the former white, the latter green, and both powdered with minute black spots. Head small and black, carapace heavy but not as adequate as usual. Laterally on segments 9 and 10 are respectively, large red and white spots. The anal segments are flattened and truncate, possessing tubercles and gland. The tubercles are blunt thick yellowish structures which are exserted at a slight angle outwards from the vertical, but are not oscillated. They are placed just below the gland and close to each other; the gland is situated centrally above them and has a large pinkish oval orifice. Length, 25 mm.

Pupa. The pupa is dull brownish-green, broad, blunt, and much contracted. It is "waisted" laterally and dorsally between the thoracic and abdominal segments. The thorax is ridged, curving evenly to the head-case, the width being much the same throughout, although slightly wider at the wing-cases and thence tapering in both directions. Between the green wing-

cases and the thorax are some white markings; dorsal line dark sepia reaching only to the thorax, head-cases very blunt. Length, 20 mm.; breadth, 8 mm.

Parasites. Four species of *Neotypus* (Hymen., Ichneumonidae) were bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, Sept., 1933.

17. *Hypolycaena philippus* (Fabr.) (48).

Papilio philippus Fabricius, 1793, *Ent. Syst.*, **3** (1) : 283.—*Hypolycaena philippus* Aurivillius, 1922, *in* Seitz *Macrolep. World*, **13** : 384, t. 67a.

Early stages : Lamborn and Poulton, 1911, *Proc. ent. Soc. Lond.*, **1911** : c–ci.—Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 474 (ant-attended larva) (S. Nigeria).

Food-plant. The larva feeds on the seed capsules and leaves of *Ximenia americana* Linn., Oleaceae.

Egg. White, circular and domed, with a prominent black central spot; the surface ornamented with a deeply cut reticulated pattern. Diameter, 0·5 mm. It is laid on or near the small seed capsules.

Larva. Clear dark green and immaculate, with smooth velvety skin and segment divisions sharply defined, but not incised. The margins are slightly scalloped and are fringed with short brownish hair. In shape regular, barely narrowing at the extremities and much like some species of typical Lycaeninae. Collar broad, rounded and paler green. There is a distinct gland, fringed with short brown hair and having a dark oval orifice; there are apparently no tubercles which, if true, is most unusual. Length, 17 mm.; breadth, 4 mm.

Pupa. The pupa is dark green with a few lighter chalky markings and a fine pale dorsal line. It is regular in shape and rather like an *Anthene* pupa, but broader than most. Thorax ridged with a slight central depression between it and the abdominal segments. Length, 8 mm.; breadth, 5 mm.

Locality. North Kavirondo: Kitosh, slopes of Mt. Elgon, about 5,500 feet, May, 1934.

18. *Stugeta olalae* Stoneh. (49).

Stugeta olalae Stoneham, 1933, *Bull. Stoneham Mus.*, **17** : 2 (Kenya).

Food-plant. The larva feeds on the leaves of *Ximenia americana* Linn., Oleaceae.

Egg. Greyish-white. It is circular and domed, not flattened above, but with a small black central spot. The texture of the shell is like velvet. It is laid on the uppersides of the leaves. Diameter, 0·75 mm.

Larva. Until nearly full grown the larva is green with red spots on the knife-like dorsal ridge. Later, however, when nearing pupation, the extremities are dull brownish-green to black, and the whole central portion chalky white. The skin is polished and semi-translucent, but deeply pitted and uneven, with the segment divisions deeply incised. Carapace broad and well developed with scalloped edges. The dorsal ridge rises abruptly from the head, curving over in a series of roughly pointed processes to the flattened anal segments. Both the collar and anal extremity are bifurcate, the former bluntly, the latter very sharply so, with the central portion of the former depressed and carrying a rounded highly polished central spot. The lateral margins have two very broad wing-like processes between segments 4 and 5, and slope away evenly from these in both directions. There appear to be neither tubercles nor gland, and no ants were in attendance. Length, 20 mm.

Pupa. The pupa is very strangely formed. The colour dirty grey to brownish-white with darker markings and four black streaks, resembling "eye-spots," especially the anterior pair, placed just below the central dorsal

ridge on either side. Starting at the posterior extremity, there is firstly a very long narrow stalk, fully 5 mm. long, more or less flattened above, becoming gradually broader until it meets the wing-cases; here dorsally, above the centre of the wing-cases, is a large double hook-like process raised about 2 mm. above the general level, the anterior of the pair being larger and higher. Following on this is a deeply curved depression, and finally the broadly humped thorax, sloping abruptly to the head-case. Ventrally the wing-cases stretch over the whole length except for the stalk. The pupa stands out at an angle from the stem of the food-plant with no support except for the extremity of the stalk, and is jointed at the junction of this with the main body. Length, 15 mm.; breadth, 5 mm.

Locality. N. Kavirondo: Kitosh, slopes of Mt. Elgon, about 5,500 feet. September, 1935.

19. *Argiolaus silas crawshayi* (Btlr.) (12).

Iolaus crawshayi Butler, 1900, *Proc. zool. Soc. Lond.*, **1900**: 926.—*Iolaus silas crawshayi* Aurivillius, 1923, *in* Seitz *Macrolep. World*, **13**: 396, t. 68b.

Food-plant. The larva feeds on the young leaves of *Loranthus usuiensis* Oliv. and *Loranthus Dregei* E. & Z., Loranthaceae.

Egg. White, circular at base, domed, with a slight central depression. Diameter, about 1 mm. It is laid singly on the undersides of the leaves, or on the tips of the new shoots.

Larva. The larva is very minute when freshly emerged and feeds up comparatively slowly. It is dull dirty whitish-green or brown, and hairy; the hair collects the loose dusty covering of the young leaves, rendering it practically invisible until almost full grown. In the last stage it is green, leaves the very young shoots, and feeds along the edges of the larger leaves. Here it contrives to fill up the resultant gap between itself and the leaf, the knife-edged dorsal ridge forming a very good imitation of the edge of the leaf, making it again very difficult to detect. It is slug-like, the cross-section being triangular. The first three segments are broad, rising abruptly to the highest point of the dorsum at segment 3, gradually tapering from there to a point at the anal extremity; this latter is sharply bifurcate. The dorsal ridge is knife-edged, the skin rough and carrying very fine short hair. Carapace broad and adequate, completely protecting the legs. There is no sign of either tubercles or gland, and no ants seem to be in attendance. Length, 25 mm.

Pupa. Silk is spun over the surface of a leaf and the pupa is attached to this by its posterior extremity, the abdominal segments being arched over to the head-case which rests on the leaf. It is green with a row of brown dorsal spots. The thorax is bluntly ridged and is followed by a depression, then a large hump at the beginning of the abdominal segments, and finally tapers sharply to the posterior extremity, which is stalk-like and jointed. When alarmed the pupa will hammer rapidly on the leaf with its head-case, making quite sufficient noise to frighten away a small predator. Length, 15 mm.

Parasites. A species of Tachinid was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, October, 1932.

20. *Epamera bansana yalae* Rly. (11).

Epamera bansana yalae Riley, 1928, *Nov. Zool.*, **34**: 385, pls. X, XI, f. 17 (♂), 18 (♀) (Kenya).

Food-plant. The larva feeds on *Loranthus woodfordioides* Schweinf., Loranthaceae, chiefly on the flowers when these are present, and it is coloured

pink or reddish to resemble them; when no flowers are present, it feeds on the leaves, and is then green.

Egg. White, circular and slightly domed, with a pretty network pattern. Diameter, about 0·5 mm. It is laid amongst the flowers, on or under the leaves, or on the stems, rather indiscriminately, singly or in pairs.

Larva. The larva is very strangely shaped. Seen from above, the outline across the head is square, running from here in straight lines to the widest part at segment 3, then tapering, again in straight lines, to the anal segments, where there are two fin-like lateral processes, and finally terminating at the anal extremity in a point. The dorsum is coloured lighter as a rule, with dark patches on segments 2, 3, 10, and 11, but the colouring, as stated above, is very variable, being merely procryptic in design. In profile the dorsum drops vertically to the head. Sometimes the lateral anal "fins" are white, as also the point of greatest width at segment 3. There are apparently neither tubercles nor gland. Length 12 mm.

Pupa. The pupa is pinkish-brown, the anterior half being darker with a pink spot at the apex of the thorax. The head-case is blunt, the thorax rising abruptly from it, slightly "waisted" beyond, then rising again to a ridge running transversely across the origin of the abdominal segments. The latter are here broad and flattened, with (on either side behind the ridge) a pit or depression, and above these on the dorsum a jet-black spot. The posterior extremity is tapered and stalk-like, and is attached to a stem or among the flower clusters. Length, 11 mm.; breadth, 5 mm.

Locality. Mt. Elgon.

21. *Epamera sidus* (Trim.) (14).

Iolaus sidus Trimen, 1864, *Trans. ent. Soc. Lond.*, (3) **2**: 176.—*Epamera sidus* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 402, t. 68h.

Food-plant. Loranthus woodfordioides Schweinf., Loranthaceae, is eaten, the larva feeding on the leaves or young flower-buds, but not as a rule on the flowers after they have opened.

Egg. The eggs are laid on the upper- or undersides of the leaves, on the buds, stems, etc., without any apparent effort at concealment. They are yellow, circular and domed, with a complicated embossed pattern covering the surface. Diameter, about 0·5 mm.

Larva. The larva is very strangely formed. Green or greyish-green with a large whitish triangular spot filling up the central depression. Beginning at the anal extremity and arising from the last four segments there is a large tent-like process ending in a curved and sharply pointed spike; following this is a deep valley, the bottom of which is only 3 mm. in total thickness. Finally the dorsum rises again to a curved knife-edged ridge extending over three-quarters of the total length, and from this falling almost vertically to the head. At the highest point of this anterior dorsal ridge, the depth is 6 mm. There are apparently neither tubercles nor gland, although the carapace is more than adequate for protection against ants. Length, 15 mm.

Pupa. Resembles a seed capsule of the plant. The posterior segments are contracted into a thin stalk which is fixed to a twig, and are articulated so that the head-case can be hammered against the surface of the twig when an enemy comes too close. The whole pupa is so contracted that the overall length is only 6–7 mm. The dorsum is rounded, the thorax slightly ridged, and in

general the shape is semispherical and strongly reminiscent of a berry. It is green with the exception of a large sepia brown patch on the thorax.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, Jan., 1932, and April, 1931.

22. *Epamera tajoraca haemus* Talbot (13).

Epamera tajoraca haemus Talbot, 1935, *Ent. mon. Mag.*, 71 : 118, pl. 2, f. 2, pl. 3, f. 17 (Kenya).

Food-plant. The larva feeds chiefly on the unopened flower-buds, but also on the leaves of *Loranthus curviflorus* Benth., Loranthaceae.

Egg. Pure white and shaped like an inverted saucer with a flat base. The surface carries a heavily indented network pattern visible to the naked eye. As with all Lycaenids, the young larva emerges from a neatly cut circular hole in the centre of the top of the egg. The egg is laid on the upper or under surfaces of the leaves, singly or in pairs. Diameter, 0·5 mm.

Larva. When freshly emerged very pale greenish-olive with a darker dorsal line. The dorsum is fin-like and drops very abruptly to the head, rising at first in the other direction to the highest point on segments 4 and 5; it then tapers gradually to the anal extremity. Looked at from above it is centrally broad; starting from the head it reaches its maximum width at segments 4 and 5, and again tapers as far as the last four segments, which are narrow but of almost equal width. There are three light coloured spots on the sides and the segment rings are deeply corrugate. When full grown the colour changes to grey, with black dorsal spots. Neither tubercles nor gland are present. Length, 20 mm.

Pupa. Very dark, mottled black or brown, resembling closely the rough gall-like nodes on the stems of the food-plant, sometimes with green markings like lichen. Seen from above the posterior extremity is stalk-like and attached as a stalk flat on to a twig. It widens gradually to the centre of the wing-cases, beyond which there is a " waist "; then there are slight central projections of the thorax, and thence to the head-case it is narrow and short. The latter is blunt, but bilobed, in profile slightly upturned; the thorax domed but very irregular, and between it and the abdominal segments is a very deep depression. The abdominal segments being the highest point, start well above this depression and curve over and down sharply to the stalk. The segment rings are well defined as in the larval stage. Length, 10–12 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, October, 1933.

23. *Aphnaeus hutchinsoni drucei* Neave (37).

Aphnaeus drucei Neave, 1904, *Nov. Zool.*, 11 : 338, pl. I, f. 6.—*Aphnaeus hutchinsoni drucei* Aurivillius, 1924, *in* Seitz *Macrolep. World*, 13 : 409.

Food-plant. The larva is found on *Acacia stenocarpa* Hochst., Mimosaceae, also on *Entada abyssinica* Stend., Mimosaceae, and on certain species of *Loranthus*, but always where a nest of ants is present.

Egg. The egg is grey to black, the surface heavily and symmetrically pitted. Circular at base, the walls rise vertically to a rounded top, 1 mm. in diameter. It is laid singly on the twigs of the tree where the bark is old enough to have become lignified, and is even laid on dead branches.

Larva. Light greenish when young, later changing to dark brown and when full grown it is dull purplish-grey. The head is very large, dull brown, with a sharply ridged collar. Segments very clearly defined and deeply incised; it is dorsally flattened, the sides falling away vertically from the ridged edges

of the dorsum so that a cross-section would be square. The larva, when half grown, is covered with short hair especially laterally, and has a black dorsal line which disappears later leaving only small lateral fringes of hair. The anal segments are flattened and posteriorly rounded, segment 11 being laterally enlarged with a transverse ridge across it, carrying at each extremity a prominent brown external tubercle. The actual organs are short thick whitish structures which are continuously and very rapidly exserted and retracted in the presence of ants. The larva bores into the smaller branches, leaving large circular burrows in one of which it pupates. Ants are constantly in attendance, and are in fact essential to its life, for if they are removed the tubercles and gland gradually grow mould and the larva dies. Length, 30 mm.

Pupa. The pupa is placed inside one of the excavated tunnels. First, the surface of the tunnel is lined with silk, then both ends are sealed with thickly spun silk wads, leaving an enclosed area roughly 1½ in. long, inside which to pupate in complete seclusion from ants. The pupa is long and narrow, the abdominal segments being rather prominent and doubled back at the posterior extremity to form a short stalk ventrally for attachment to the surface of the tunnel. Thorax regularly domed. It is brown speckled with black, and is lighter dorsally. Length, 20 mm.

Note on probable food. The very powerful head and mouth-parts seem to suggest that the larva feeds on bark or more probably on the inner heart-wood of the twigs. It certainly bores tunnels into these, but will not feed up in captivity. Its actions, on the other hand, seem to point to a concentrated food, for it will remain motionless in the same place for several days without apparently feeling the need for food. Possibly an ant fungus is the food, in which case the powerful jaws would serve merely to enable the larva to bore into the nests in search of it. It remains in its own tunnels, although it can also be found just inside the entrances of those of the ants. In the immature stage it is found on the twigs, and will in captivity feed up for a short time on the leaves.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March, 1933.

24. *Spindasis nyassae* (Butl.) (40).

Aphnaeus nyassae Butler, 1884, *Ent. mon. Mag.*, **20** : 251.—*Spindasis nyassae* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 413.

Food-plant. The larva is found on the bark of *Acacia stenocarpa* Hochst., *Entada abyssinica* Stend., Mimosaceae. It is always ant-attended and dies immediately if all ants are removed.

Egg. Not known.

Larva. The larva is extraordinarily like those of some Lymantriids. The dorsum is red-brown mottled with black, with a very fine grey dorsal line, the brown colouring entering the margins of the first three segments in stripes. On the dorsum, also, are two rows of orange warts bearing short white spines. The sides are white with rows of minute black spots. Head, small and polished brown, carried rather far forwards when on the move. The first and the anal segments are armoured with dark brown chitinous plates; the former or collar being hood-like and protecting the head, the latter, at segment 11, somewhat enlarged laterally and carrying two long black external tubercles. From these are exserted whitish thread-like organs which are directed inwards and slightly forward of the vertical, and are rapidly oscillated; the actual organs are about 0·5 mm. long. In front of the tubercles and just beyond the chitinous plate is the gland. Length, 20 mm.

Pupa. The pupa is usually found under the bark, the last few abdominal segments being folded under and attached. Head-case blunt, shoulders of wing-cases prominently angled, the thorax domed, smooth and polished. The abdominal segments are somewhat flattened, the divisions being sharply defined. Length, 15 mm.

Notes on the possible food. In the young stages, this species is also found on the terminal shoots and will feed on them, if ants are provided, up to a certain stage, after which in captivity it dies. The later stages in nature are spent on the bark among ants. The mouth-parts are small and I am inclined to think fitted best for absorbing a secretion, and that although it is able in the early stages to feed on the shoots and even does so with some advantage, it is not the main source of food supply.

Parasites. Two species of *Anilastus* (Hymen., Ichneumonidae) were bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, January, 1933.

25. *Chloroselas pseudozeritis tytleri* Rly., f. *umbrosa* Talb. (38).

Chloroselas pseudozeritis tytleri f. *umbrosa* Talbot, 1935, *Ent. mon. Mag.*, 71 : 207, pl. IV, f. 4, 5, 7, 8 (Kenya).

Food-plant. The larva is found in the early stages on the terminal shoots of *Acacia stenocarpa* Hochst., Mimosaceae, always, however, on the stems; later it travels down to the bark of the tree.

Egg. Not known.

Larva. The larva is light brown with a darker dorsal line and wavy black lines along the centre of the sides. It is flattened, with the dorsum evenly rounded, and the margins scalloped and bearing long hair. The collar is armoured with a polished black chitinous plate, as also is the anal extremity. Head very small. Tubercles are present on the edges of the supranal plate, and are exserted on stimulation and vibrated rapidly from side to side; they are long and whitish. Strangely enough there appear to be two glands, for the ants attend to a darker oval area just above the anal plate, and also to a structure under the collar. After many hours of watching under a lens, I am convinced that this is so, for an ant having once found the collar does not leave it, and they never showed a preference for the anal gland. The larvae are always covered with ants, and, in fact, are never without them and, as one would expect, quickly die if the ants are removed. Length, 15 mm.

Pupa. The pupa is hidden in cracks or under the bark. It is black and polished. In shape narrow, with prominent head-case and shoulders, the thorax slightly ridged, while the abdominal segments are tapered evenly to the extremity. The latter is slightly stalked and folded beneath the pupa for attachment to the bark. Length, 10 mm.

Note on the probable food. When very young the larva is found on the small twigs among ants, although the twig need not necessarily be carrying any leaves. Usually the ants are attending a scale insect and the larva lies among these. A twig carrying scale, however, and not ants, does not satisfy it, and I therefore came to the conclusion that the food has something to do with the ants and not with the scale. Having a few larvae which had not fed for some days, I presented them with a fresh twig covered with scale which the ants had been attending, and the surface of the twig was very carefully examined from end to end with a slow waving motion of the head. Every now and then the head was dropped motionless on to the twig and left there for a few seconds, as if sucking something; the scale was left severely alone and not even in-

vestigated. When about half grown the larvae leave the twigs and are found in the ant-runs on the bark, where again I have seen them moving very slowly over the surface. Although many hours have been spent watching, I have never seen an ant feed them. The mouth-parts have not been examined here microscopically, but they seem to be very minute and to suggest some secretion as the food; it is possible that it feeds upon something left in the runs by the ants, perhaps the excreta.

Ant associated. Crematogaster (*Acrocoelia*) *gerstaeckeri* D.T. st. *sjoestedti* Mayr. var. *tricoloroides* Sants.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, April and November, 1932.

26. *Axiocerses amanga* Westw. (34).

Axiocerses amanga Westwood, 1881, *in* Oates' *Matabeleland*: 351.—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 421, t. 70 b, c.

Food-plant. The larva spins together the edges of a leaf of *Ximenia americana* Linn., Oleaceae, and lives under cover, feeding at night and pupating also in the leaf in an exactly similar manner to the HESPERIIDAE.

Egg. White, about 0·5 mm. in diameter at base, and nearly hemispherical. There seems to be no pattern of any sort visible at least through an ordinary lens, the shell being smooth. The egg is laid on the undersides of the leaves.

Larva. Hairy and coloured greenish-brown irrorated with white, darker on either side of the dorsum. The laterals are fringed with short light-coloured hair, as are also the segment rings. Collar black or very dark brown, head and anal extremity bluntly rounded, both gland and tubercles are present. The tubercles have black external casings and are exserted from these for a very short distance only, and quickly retracted again. They are rather larger in diameter than usual and are white with a darker centre and rounded apices. Attended by ants.

Pupa. The pupa is black with smooth and polished casing and no markings. Head-case bluntly rounded, and from here the pupa tapers evenly to the posterior extremity.

Ant associated. Camponotus (*Myrmopyromis*) *niveosetosus* Mayr. var.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–700 feet, November, 1932, and March, 1933.

27. *Leptomyrina lara* (L.) (44).

Papilio lara Linnaeus, 1764, *Mus. Lud. Ulr.*: 320.—*Leptomyrina lara* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 423, t. 70b.

Food-plant. The larva burrows into the thick fleshy cortex of the leaves of *Kalanchoe Lugardii* Bullock, Crassulaceae, hollowing them out until full grown, when it emerges to pupate.

Egg. Very small, white and evenly domed, being a complete hemisphere, less than 0·5 mm. diameter at base. It is laid singly on the upper or under surfaces of the leaves, usually low down on the plant.

Larva. The larva is pale translucent green, with a narrow pink dorsal line and wavy lateral lines, and in addition with a row of small black spiny warts along each side. Through a lens the skin is seen to be clothed with short yellowish hair. In shape the larva is somewhat flattened, the anal extremity broadly rounded and the lateral "skirts" well developed with scalloped margins. Head very small and dark brown. Length, 22 mm.

Pupa. Green or brown, speckled and peppered with grey. Seen from above

it is evenly curved from the head to the posterior extremity, the widest point being about the centre and the outline nearly oval. There are laterally neither "waist" nor "shoulders." The abdominal segments are much contracted and therefore wider than usual, and the head-case smoothly rounded, not bilobed. In profile the thorax is slightly domed, there being a small depression between it and the abdominal segments. It is broader and shorter in size than is common in this type of Lycaenid pupa. Length, 10 mm.; breadth, 5 mm.

Parasites. *Tetrastichus sculpturatus* Waterst. (Hymen., CHALCIDIDAE) was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, April, 1933.

28. *Spalgis lemolea* Druce (39).

Spalgis lemolea H. H. Druce, 1890, *Ann. Mag. nat. Hist.* (6) **5** : 26.—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 433, t. 71b.

Early stages : Lamborn and Poulton, 1911, *Proc. ent. Soc. Lond.*, **1911** : civ–cv.—Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 475 (larval habits and Coccid food) (S. Nigeria).—Mellor, 1929, *Proc. ent. Soc. Lond.*, **4** : 8.

Food. The larva feeds on Coccids which in this case were living on an ornamental foliage plant.

The carnivorous nature of the larva was first described by the Rev. A. C. Good in West Africa (1892, *Psyche*, **6** : 201). Mr. J. E. M. Mellor found the larvae feeding on Coccids on a Cycad in Zanzibar.

Larva. Broad and slug-like, either black or dark grey, and hairy. The colouring, however, is usually invisible for it covers itself with a white waxy secretion produced by the Coccid and is then very hard to detect. Length, 15 mm.

Pupa. The pupa is an interesting example of protective coloration. It is placed most conspicuously on the upper surfaces of the leaves and coloured in whites, greys and blacks to represent a bird-dropping, which it does exactly. The anal extremity is tapered to a narrow square-ended stalk, which serves as an attachment to the leaf. From here, the abdominal segments are much broadened and intersegmentally contracted, being thus roughly spherical. There follows a slight waist between these and the thorax, which is slightly domed and falls vertically to the leaf. The head-case is placed beneath the pupa on the edge of the flattened ventral surface. From the wing-cases and including them, round the front of the thorax, the lateral margins are white, as also is the posterior half of the abdominal segments, while the remainder is blackish-brown mottled and irrorated with white or cream. Length, 7 mm.; breadth, 4 mm. at broadest point.

It seems that the protection afforded by its coloration is most effective, for out of 15–20 pupae taken from one small bush, not one was parasitised, and judging by the numbers on the bush, both of fresh pupae and empty cases, the birds had not discovered the deception.

Locality. Uganda : Bunyoro, Bugoma Forest, September, 1932.

29. *Anthene wilsoni* (Talb.) (6).

Lycaenesthes (*Cupidesthes*) *wilsoni* Talbot, 1935, *Ent. mon. Mag.*, **71** : 121, pl. II, f. 10, pl. III, f. 13 (Abyssinia), ♀.

Food-plant. The larva is found in ants' nests in hollow trees, in this case *Acacia abyssinica* Hochst., and *Entada abyssinica* Stend., both Mimosaceae. As a rule it is found right in the nest amongst the ant larvae and debris at the bottom, or in the early stages along the runs.

Egg. I have not seen the egg of this species.

Larva. The larva is in shape and colour like a wood-louse, being broad and flattened, with deeply incised segments and rounded dorsum, coloured grey. The skin is smooth and polished and the segments overlap, the first completely covering the head. Both extremities are broadly rounded and there are short lateral fringes of hair, and hair also on the segment rings. Neither tubercles nor gland appear to be present, a most surprising fact in view of its very close association with the ants. Length, 18 mm.; breadth, 6 mm.

Pupa. A hard, dark brown cocoon is built against the side of the ants' nest; it is formed from the wood-debris at the bottom of the nest. The pupa itself is black with domed thorax and bluntly prominent head-case. The abdominal segments are broad and flattened with lateral rows of hair-bearing warts running longitudinally down each side. The posterior extremity terminates abruptly in a broad, flattened stalk, which is attached to the tree from inside the puparium. Length, 15 mm.

Note on the probable food. The larva will not feed up in captivity on anything so far tried. The ant larvae and pupae were refused and if the ants feed it, the act has never been observed. When placed in a box with ants, it is usually devoured within a few hours. Bark, the debris from the nests or the ligneous material built round the insides of the nests, met with no better success, so that it seems probable that a fungus grown by the ants may be the food.

Locality. Kenya: Kitale, December, 1932; Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, January, 1933.

30. *Anthene ligures* (Hew.) (60).

Lycaenesthes ligures Hewitson, 1874, *Trans. ent. Soc. Lond.*, **1874** : 349 (Angola).—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 440, t. 71f.

Food-plant. Celtis sp., Urticaceae.

Egg. The eggs are white and very flattened and laid on the under surfaces of the leaves. Diameter, 0·5 mm.

Larva. The larva is very broad and flat. Green with darker green dorsal line, flanked on either side with yellow. It carries short hair especially fringing the scalloped margins. Collar unusually large and broad. Dorsum rounded and spiracles white. There are apparently neither tubercles nor gland, and no ants were in attendance. Length, 15 mm.; breadth, 5 mm.

Pupa. The pupa differs from those of other *Anthene* in that the abdominal segments are centrally very broad and much flattened. It is placed horizontally on the underside of a leaf and attached with silk, both on the surface of the leaf and over the dorsum. In colour it is greenish-brown with fine dark dorsal line, and a white triangular spot between the thorax and abdominal segments, and with the same white spiracles as in the larva. The head-case is narrow, sloping sharply outwards to the broadest part midway along the abdominal segments and then abruptly back again to the extremity, the shape being, therefore, roughly that of a diamond. Length, 9 mm.; breadth, 6 mm.

Locality. Kenya: Kavirondo, Kabras-Kakamega.

31. *Anthene definita* (Btlr.) (8).

Lycaenesthes definita Butler, 1899, *Ann. Mag. nat. Hist.*, (7) **4** : 342.—Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910** : 26, pl. I, f. 5 (♀), f. 6 (♂).—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 441, t. 71e.

Food-plant. The larva is a very general feeder and may be found on the young shoots of many different plants of widely different families. They are given

here in their order of popularity, though the first is probably the original and undoubtedly the most important: *Bersama engleriana* Gurke, Melianthaceae; *Kalanchoe crenata* Haw., and *Kalanchoe Lugardii* Bullock, Crassulaceae; *Acacia abyssinica* Hochst. et Benth., *Acacia stenocarpa* Hochst., *Albizzia gummifera* (Gmel.) C. A. Smith, Mimosaceae; *Rhus incana* Mill., Anacardiaceae. As regards the second family and the last, the larvae feed on the flowers, otherwise on the young leaves.

Egg. The egg is circular, somewhat flattened, and very pale green when freshly laid. Diameter, about 0·5 mm.

Larva. The larva is a modification of the usual onisciform type. The dorsal ridge consists of single tent-like processes, each much enlarged and very sharply pointed with the posterior surfaces cut off vertically. The collar is very prominent, projecting far anteriorly and completely covering the head. Lateral edges strongly scalloped and fringed with hair. The colour varies with the food-plant, sometimes red (*Albizzia*) or green (*Bersama*) or a combination of dark and light green, giving it a speckled appearance, very effective on the feathery inflorescence of *Rhus incana*. The inner edges of the dorsal processes and the edges of the carapace are usually white or pinkish-white. The anal segments are small with prominent anterior shoulders and the extremity narrowly rounded. The tubercles appear just between the last pair of spiracles and the shoulders mentioned above, and are therefore rather near the edge. They are long, thin, and white, with a large terminal rosette of spines, and are exserted vertically. The gland, with oval pinkish orifice, is placed centrally just above these. Length, 15 mm.

Pupa. Green or brown with a white diamond-shaped mark in the depression between thorax and abdominal segments. The shape, seen from above, is also that of a diamond, being rather pointed at the extremities and from each diverging in straight lines to the widest part in the centre, with a small irregularity at the shoulders of the thorax. In profile the thorax is ridged, followed by a depression, and lastly the abdominal segments are much contracted and curve strongly and abruptly to the extremity. It is fixed with silk flat on the surface of a leaf or stem. Length, 11 mm.; breadth, 6 mm.

Parasites. Brachymeria (probably *leighi* Cam.) (Hymen., Chalcididae) was bred, as well as a Tachinid.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, January and March, 1932.

32. *Anthene otacilia kikuyu* (B.-B.) (5).

Lycaenesthes otacilia kikuyu Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910 : 37**, pl. II, f. 2 (♂) —Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13 : 443.**

Food-plant. The larva feeds on the young terminal shoots of *Acacia stenocarpa* Hochst., and *Acacia Lahai* Stend., Hochst., et Benth., Mimosaceae.

Egg. I have not seen the egg of this species.

Larva. The larva is very similar to that of *A. pitmani*. In colour very dark green, it is more than usually hairy, and in this latter respect quite different from the other. The dorsum is double ridged, bluntly but prominently toothed, the points of the teeth being yellow and the depressions between red. Collar small, though segments 2 and 3 are much enlarged and almost overhang it. The lateral skirts are scalloped and edged with yellow. The flattened anal segments are narrow and rounded posteriorly, light chalky green with a longitudinal dark green dividing line; somewhat more than half-way between this and the edge are the tubercles, yellowish-white, rather long delicate structures, with a terminal

rosette of bristles, and exserted somewhat laterally of the vertical. The gland is placed midway between, with a black crescent-shaped orifice. Length, 12 mm.

Pupa. Identical with that of *A. pitmani* Stempff., except that the head-case is much broader.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, April, 1933.

33. *Anthene pitmani* Stempff. (4).

Anthene pitmani Stempffer, 1936, *Rev. Fr. Ent.*, **3** : 139, f. 4 (genit.) (Kenya).

Food-plant. The larva feeds on the young shoots of *Acacia stenocarpa* Hochst., *Acacia abyssinica* Hochst. et Benth., and *Acacia Lahai* Stend., Hochst., et Benth., Mimosaceae.

Egg. The egg is circular, pale bluish-green, and flattened on top with a network of surface ornamentation in relief. There is a minute black central spot, less than 0·5 mm. in diameter. The egg is laid singly on the terminal shoots or leaflets.

Larva. Dark yellow-green with diagonal yellow lateral stripes and a yellow edging round the collar. The skin has a polished appearance as if moist. It is onisciform with well-developed collar and scalloped lateral "skirts." The dorsum is double ridged, the ridges consisting of rows of pointed tooth-like processes, the tips of which are yellow. The anal segments are flat and shield-shaped, and carry two tubercles placed rather close together. These are exserted vertically, and are very fine structures with a large terminal rosette. The gland is placed just under the last pair of "teeth" in the dorsal ridge, and is larger and placed further anteriorly of the tubercles than usual. Length, 12 mm.

Pupa. Either green or brown and sometimes with prominent silver lateral and dorsal stripes. It is placed with its long axis parallel to the leaf or bark, and attached by a silk thread centrally over the dorsum. The thorax is rather sharply ridged and outlined in silver. Head-case narrow. Length, 8 mm.

Ant associated. Crematogaster (*Acrocoelia*) *gerstaeckeri* D.T. st. *sjoestedti* Mayr.

Parasites. Three species of *Anilastus* (Hymen., ICHNEUMONIDAE) were bred, and also a Tachinid.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, July, 1933.

34. *Anthene lunulata* (Trim.) (3).

Lycaenesthes lunulata Trimen, 1894, *Proc. zool. Soc. Lond.*, **1894** : 51, pl. VI, f. 12.—Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910** : 40, pl. II, f. 4 (♂), 5 (♀).—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 444, t. 71c, f. g, h.

Early Stages : Farquharson, 1921, *Trans. ent. Soc. Lond.*, **1921** : 386 (larva on *Berlinia*) (S. Nigeria).

Food-plant. The plants eaten are *Entada abyssinica* Stend., Mimosaceae, and *Combretum* sp., probably *elgonense* Exell, Combretaceae. The larva feeds on the young shoots of the *Entada* and on the outer cortex of the young leaves of the *Combretum*.

Egg. White, circular, and not very much flattened on top. It has a slight central indentation and a surface network pattern. Diameter, 0·75 mm. It is laid singly among the leaflets of *Entada* and on the upper or under surfaces of the leaves of *Combretum*.

Larva. Beautiful yellow-green with a darker dorsal line which is some-

times reddish with a mottled appearance due to much yellow striation. The dorsum is rounded and broad, collar very heavy and overhanging, the lateral skirts well developed with yellow scalloped edges. The anal segments are not so flattened as usual, but both gland and tubercles are present. The former is plainly visible, the orifice being oval and red, and below it are the tubercles near the outside edges of the segment. They are long, rather thick, and yellowish, and carry a terminal rosette. They are exserted slowly almost vertically, though slightly outwards, and are retracted slowly. Length, 15 mm.

Pupa. The pupa is smooth-skinned, yellowish-white or green, with a dark dorsal line and no other markings. The shape is uncommon, being almost without prominences, evenly torpedo-shaped and very pointed at the anal extremity. The thorax is very slightly ridged, but there is no waist. It is placed horizontally along a twig or leaf. Length, 11 mm.

Ants associated. *Camponotus* (*Myrmoturba*) *acvapimensis* Mayr; *Technomyrmes detorquens* Walker; *Pheidole* sp.

Parasites. Four species of *Neotypus* (Hymen., ICHNEUMONIDAE), including *N. intermedius* Mocs., were bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, June, 1933.

35. *Anthene princeps ugandae* (B.-B.) (45).

Lycaenesthes ugandae Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910 : 32** (Entebbe).—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13 : 444.**

Food-plant. The larva feeds on the young shoots of *Entada abyssinica* Stend.

Egg. Very small, white, and slightly flattened above. It is laid among the young terminal shoots.

Larva. The larva is very similar to that of *Anthene definita*, having a single dorsal ridge formed of a row of tent-shaped processes, except on the first three segments where it is double. They are not, however, as large or sharply pointed as in the former species. At the point of each process and along the scalloped lateral edges are rosettes of spiny hair. Collar broad but rather long. In colour it is green, the lateral edges of the dorsal process being pink and those of the carapace pink and white. In addition there are rows of darker green diagonal stripes along the sides. Apparently without tubercles and gland. Length, 15–16 mm.

Pupa. The pupa is rather similar to that of *Anthene definita* and *A. larydas* in that it has a white spot stretching from the centre of the thorax to the mid-dorsal depression, but here the resemblance ends. In shape it is rather narrow and of almost equal width throughout, and so quite different from the roughly diamond-shaped pupae of the others. It is brown or green with a slight dusting of black, and with a fine black dorsal line. Head-case broad and blunt, with slight shoulders and ridged thorax. Length, 9 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, May, 1934.

36. *Anthene livida* (Trim.) (7).

Lycaenesthes livida Trimen, 1881, *Trans. ent. Soc. Lond.*, **1881 : 443.**—Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910 : 34.**—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13 : 444,** t. 72g.

Food-plant. The larva eats *Kalanchoe crenata* Haw.; and *Kalanchoe Lugardii* Bullock, Crassulaceae, feeding for preference on the flowers and seeds, but also, when these are not present, on the outer cortex of the leaves.

Egg. Small, circular and white, with a slight upper indentation and a prominent network pattern embossed on the shell. It is laid usually among the flower-heads of the plant and also, sometimes, in the nodes of the young leaves.

Larva. The larva is pale green, of a shade exactly matching the leaves of the plant. There is a central, single dorsal ridge of the same structure as that of *A. definita* (Btlr.), that is, consisting of separate tent-like processes, sharply pointed and triangular in profile, but slightly less pointed and slightly smaller than in that species. The collar is heavy and bluntly rounded, and the lateral edges of the carapace only very slightly scalloped. The anal segments are broad and regular in outline and carry both tubercles and gland. The former are short, thick and white, and seldom exserted; the latter, placed just below the last dorsal " tooth," has a dark oval orifice. Length, 18 mm.

Pupa. The pupa is either green or smoky-grey, according to whether it is placed on a living or dead leaf, with lateral abdominal rows of minute black spots, and a faint, dark dorsal line. The thorax is sharply ridged, and in the depression between this and the abdominal segments is a white diamond-shaped spot edged with black. Head-case very broad and blunt. Length, 10 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March and December, 1933.

37. *Anthene levis grisea* (Talb.) (59).

Lycaenesthes levis grisea Talbot, 1935, *Ent. mon. Mag.*, **71** : 208, pl. IV, f. 9, 14, 15 (♂, ♀) (Budongo Forest).

Food. The larva lives among *Crematogaster* ants in the inner runs and nests; it feeds therefore among them, probably on fungi grown by the ants.

Egg. Unknown.

Larva. The larva is grub-like, oval and rounded dorsally, the extremities being very similar to each other in shape. The skin is leathery and highly polished with many pit-like indentations. The collar carries a large, black, polished, chitinous plate. At the anal extremity is a large gland with brown, oval orifice, but I was unable to induce it to exsert tubercles. It is always ant-attended. Length, 10 mm.

Pupa. It is placed in the ant-runs under loose bark, with no exterior protection from the ants, evidently relying on the highly polished and hard pupa casing. Regularly shaped, without protuberances, the abdominal segments being slightly broader than the thorax. There are practically no shoulders, and the head-case is rounded and jet-black. General colour very dark brown to black. Length, 9 mm.

Locality. Budongo Forest, Uganda, August–September, 1934.

38. *Anthene amarah* (Guér.) (2).

Polyommatus amarah Guérin, 1847, *in* Lefeb. *Voy. Abyss.*, **6** : 384, pl. II, f. 5, 6.—*Lycaenesthes amarah* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 445, t. 72b.

Food-plant. The larva feeds on the young terminal shoots of *Acacia stenocarpa* Hochst., and *Acacia abyssinica* Hochst. et Benth., Mimosaceae.

Egg. The eggs are laid singly on the young shoots. They are whitish, circular and flattened, with a small dark central spot. Diameter, 0·5 mm.

Larva. The larva is green and onisciform with the lateral edges scalloped and the dorsum double-ridged and bluntly serrated. The points of the dorsal ridge and the scalloped edges of the carapace are yellow, and along the sides are

dark green, white-edged, diagonal stripes. Dorsal line between the ridges dark green. Collar bilobed. The anal segments are flattened as usual and carry a gland in the centre anteriorly and tubercles below it. The latter are interesting and unusual. The lateral anterior angles of the shield are enlarged and swollen to form shoulders, and the tubercles are exserted at a very sharp angle outwards from these; moreover, the orifice of each is on the side and therefore protected from above; the organs are rather longer than usual, whitish, with a large terminal rosette. Length, 14 mm.

Pupa. Placed among the leaves or on the bark, and therefore either green or brown. If green, there are yellow diagonal lateral stripes, and a white dorso-thoracic line with rows of prominent black spots along the abdominal segments. If brown, it is powdered with black and the black abdominal spots are not so prominent. Thorax ridged with a depression between it and the abdominal segments. Posterior extremity bluntly pointed. Length, 10 mm.

Ants associated. Crematogaster (*Sphaerocrema*) *bequaerti* For. var. *saga* Sants.; *Acantholepis affinis* Sants.

Parasites. The Hymenoptera bred comprise two species of *Anilastus*, a *Charops* (Hymen., Ichneumonidae), and an *Apanteles* (Hymen., Braconidae); a Tachinid was also bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, May, 1933.

39. *Anthene larydas* (Cr.) (10).

Papilio larydas Cramer, 1780, *Pap. Exot.*, **3** : 160, pl. 282, f. H.—*Lycaenesthes larydas* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 449, t. 71h.

Early stages : Lamborn and Poulton, 1911, *Proc. ent. Soc. Lond.*, **1911** : civ.—Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 477 (S. Nigeria).

Food-plant. The larvae feed on the young terminal shoots of *Albizzia gummifera* (Gmel.) C. A. Smith, Mimosaceae, and rests on the undersides of the leaflets.

Egg. Very pale green, circular and flattened above with fluted sides and a small dark central dot. Diameter, 0·5 mm. They are laid singly on the upper or under surface of the leaflets, always near the end of a shoot.

Larva. The larva is onisciform, coloured pale green with pink or reddish markings, exactly resembling the coloration of the food-plant. The dorsum is ridged, though only bluntly so, with the segment divisions clearly defined, and it has a red dorsal line. The sides are faintly striped with yellow and darker green, the edges of the carapace being pink and squarely scalloped. The anal segments are flattened and shield-shaped and carry tubercles, placed rather far anteriorly and near the outside edges of the shield. The tubercles are about 0·5 mm. long, whitish, with a large, spiny, terminal rosette, and are exserted laterally to the vertical. The gland is plainly visible as a small darkened patch with raised lips, placed about half-way between and just above the tubercles. Length, 15 mm.

Pupa. The pupa is dirty green with minute black speckling and a well-defined black dorsal line which encloses a white triangular spot at the junction of the thorax and abdominal segments. The latter are much contracted, being short and broad, and much pointed posteriorly. The thorax is ridged. The pupa is placed horizontally on the bark or stems of the tree. Length, 10 mm.

Ant associated. Crematogaster (*Sphaerocrema*) *striatula* Em. var. *horatii* Sants.

Parasites. Neotypus intermedius Mocs. (Hymen., Ichneumonidae) was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, December, 1931—January, 1932.

40. *Anthene crawshayi* (Btlr.) (1).

Lycaenesthes crawshayi Butler, 1899, *Ann. Mag. nat. Hist.*, (7) **4** : 342.—Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910** : 45, pl. II, f. 6.—Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 450, t. 71 h.

Early stages : Farquharson, 1921, *Trans. ent. Soc. Lond.*, **1921** 386 (larva on *Cassia alata*) (*S. Nigeria*).

Food-plant. The larva feeds on the young terminal shoots of *Entada abyssinica* Stend. and occasionally on *Acacia abyssinica* Hochst., et Benth., Mimosaceae.

Egg. White or very pale green, circular and flattened above. It is heavily embossed with a minute network pattern, and is centrally depressed with a small black spot in the depression. Diameter, 0·5 mm. It is laid among the young shoots of the tree.

Larva. The larva is very similar to that of *A. larydas* (Crm.), being onisciform, green with a dark dorsal line, and with dark diagonal lateral stripes. The only differences are that the collar is not so massive, being, though well developed, much narrower, the anal segments are shorter and narrower, and the tubercles are therefore nearer to the extremity than in *A. larydas* (Crm.). In shape, size, and relative positions the tubercles and gland are almost identical with those of that species. The lateral edges of the carapace are white and squarely scalloped. On examination through a lens, with ants in attendance, the orifice of the gland can be distinctly seen to open, emit a drop of secretion, and then close again. Length, 15 mm.

Pupa. The pupa is placed among the leaves or in cracks of the bark. It is exactly similar in shape to that of *A. larydas* (Crm.), except that the thorax is slightly less ridged. The dorsal line is black, enclosing a white diamond-shaped spot as before, and the spiracles are white and rather conspicuous. Length, 10 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, February, 1932.

41. *Anthene nigeriae* (Auriv.) (9).

Lycaenesthes nigeriae Aurivillius, 1905, *Ark. Zool.*, **2** : 16, pl. III, f. 4; *ibid.*, 1924, *in* Seitz *Macrolep. World*, **13** : 452, t. 72b.—*Triclema nigeriae* Bethune-Baker, 1910, *Trans. ent. Soc. Lond.*, **1910** : 78.

Food-plant. The larvae feed on *Acacia stenocarpa* Hochst., and *Acacia abyssinica* Hochst. et Benth., Mimosaceae, into the thick fleshy stems of the terminal shoots of which they burrow. They are always attended by ants, which in this species are essential to life; if the ants are removed, the gland and tubercles grow mould and the larva dies.

Egg. I have not seen the egg of this species.

Larva. In the early stages the larva is a dirty brownish-white, changing later to green and brown, and when full grown to black with grey markings. The segments are grey with well defined black divisions, the sides and anal segments mostly black. In shape, broader than usual, with evenly rounded dorsum, flattened gradually towards the extremities. The carapace is very well developed, completely covering the legs and venter, but the collar is small and unusual. Here, as in the case of *Chloroselas pseudozeritis* (p. 218), there is a hard, shiny, chitinous plate for protection against ants, and, as in that species, ants are constantly in attendance at both extremities, the gland

of the collar being apparently under this anterior plate. The anal segments are somewhat flattened and protected by a circular plate of similar hard chitin, and they carry both tubercles and gland. The former are just below, on either side of the plate, in two small dark patches; they are short and dirty white, with a slight rosette. They are exserted vertically, but not vibrated. The gland, just above the plate, is shaped like a half-moon and is brown. Length, 13 mm.

Pupa. The pupa is dark sepia-brown with slight striation of lighter colour on the dorsum and a dark abdominal dorsal line. It is very evenly curved with little or no ridge on the thorax or " waist " between the latter and the abdominal segments. The head-case is narrower than usual and somewhat pointed, but not prominent. Length, 9 mm.

Ant associated. Crematogaster (*Sphaerocrema*) *bequaerti* For. var. *saga* Sants.

Locality. Mt. Elgon.

42. *Phlyaria cyara* (Hew.) (19).

Lycaena cyara Hewitson, 1876, *Exot. Butt.*, **5**, *Lyc.*, pl. I, f. 9, 10 (Angola).—*Cupido cyara* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 460, t. 72h.
Phlyaria cyara f. *tenuimarginatus* Grünb., 1908, *SitzB. Ges. nat. Fr. Berl.*, **1908** : 475.—Aurivillius, 1924, *loc. cit.* **13** : 460 (*Cupido*).

Food-plant. The larva feeds on the young shoots of *Albizzia gummifera* (Gmel.) C. A. Smith, Mimosaceae.

Egg. Not known.

Larva. The general colour is light brown with a darker patch on segments 6 and 7 and on the points of the dorsal process, the anal segments bright green. Running round the collar and for some way back along the sides is a fine black line. In shape, it is unusual; sloping upwards sharply from the flattened anal segments there are first two massive tent-like processes on segments 8 and 9, thereafter a depressed area as far as the thoracic segments, and lastly here again the same large dorsal prominences, becoming gradually smaller towards the head. The collar and carapace are in this species very well developed. On the flattened anal segments near the lateral edges and about midway along them are two minute tubercles, white, and exserted vertically, being even then only just visible; placed centrally between them is a gland. Length, 15 mm.

Pupa. Brown or light brown, and smooth with a dark dorsal line throughout its length. The abdominal segments are long and broad, the thorax small, narrow and slightly ridged, while the head-case is bluntly rounded, but hardly projects beyond the thorax. There is a distinct waist both laterally and dorsally between the latter and the abdominal segments. Length, 12 mm.

Locality. Kenya : Kavirondo, Kakamega, March, 1934.

43. *Phlyaria heritsia* (Hew.) (18).

Lycaena heritsia Hewitson, 1876, *Exot. Butt.*, **5**, *Lyc.*, pl. I, f. 11, 12 (Cameroons).—*Cupido heritsia* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 460, t. 72i.

Food-plant. The larva feeds on the young leaves of *Bridelia micrantha* Baill., Euphorbiaceae, and rests on the under surfaces.

Egg. White, circular, and very small. It is laid on the very young shoots and usually well hidden.

Larva. The larva is a beautiful shell pink with a thick green dorsal line flanked on either side by fine irregular yellow lines. It is hairy, and the margins are squarely scalloped. In shape, it is broad and very much flattened, thicker, however, along the midline of the dorsum; a cross-section would therefore be a much flattened triangle. The outline tapers from the centre to each extremity. Just before pupation the colour changes to orange red with a dark dorsal stripe. There appear to be neither tubercles nor gland. Length, 13 mm.; breadth, 4 mm.

Pupa. The pupa is long and narrow and reddish-brown with two black spots on the shoulders of the abdominal segments, and a thin black dorsal line. The thorax is small but ridged, leaving a slightly depressed area between it and the abdominal segments, both laterally and dorsally. Placed among dead leaves or on the bark. Length, 11 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March, 1932, and July, 1933.

44. *Uranothauma nubifer* (Trim.) (28).

Lycaena nubifer Trimen, 1895, *Trans. ent. Soc. Lond.*, **1895** : 187, pl. 5, f. 4, 4a.—*Cupido nubifer* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 462, f. 72*l*.

Food-plant. The larva feeds on the young shoots of *Acacia abyssinica* Hochst. et Benth., Mimosaceae, preferring the secondary to the terminal buds, and resting by day along the stems.

Egg. White, circular, and flattened, with a dark, slightly depressed, central spot. The edges are boldly fluted. It is laid lower down the branches than other *Acacia*-feeding Lycaenids, on the old leaflets, stems or bark, or in the nodes of the secondaries or spines, and always singly. Diameter, 0·75 mm.

Larva. The larva is pale green in the early stages and when mature is light brown. The dorsum is double-ridged and broadly toothed, the space between the ridges being chocolate and broader anteriorly. Collar broad and rounded. Along the sides are darker diagonal stripes ending each in a small black spot, and the edges of the carapace are strongly scalloped and fringed with hair. An unusual character in this species is that the scalloped lateral edges continue throughout the length to the posterior extremity, the actual extremity forming the final lobe. The anal segments therefore, although flattened as usual, have a scalloped lateral outline, and the dorsal ridge also continues further into them than in most other species. There is no sign of tubercles or gland and ants do not appear to be in attendance. Length, 13 mm.

Pupa. The pupa is blackish to brown, narrow, broadening gradually across the abdominal segments. Thorax somewhat elevated with a depression between it and the abdomen. Head-case square. There is a dark dorsal line, and the surface is hairy. Length, 8–9 mm.

Parasites. The Hymenoptera bred comprised three species of *Anilastus* and a *Mesochorus* (Hymen., Ichneumonidae), three *Apanteles* (Hymen., Braconidae), and *Tetrastichus sculpturatus* Waterst. (Hymen., Chalcididae).

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, December, 1933.

45. *Uranothauma delatorum* Heron (27).

Uranothauma delatorum Heron, 1909, *Trans. zool. Soc. Lond.*, **19** : 161.—*Cupido delatorum* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 462.

Food-plant. The larvae feed on the young shoots of *Albizzia gummifera* (Gmel.) C. A. Smith, Mimosaceae, but are far more retiring than the other

common species, i.e. *Anthene larydas* (Cr.), which also feeds on this tree. They are usually found among the dense new growth of a coppiced sapling in forests or river beds.

Egg. Not known.

Larva. The larva is green or pink with a dark dorsal line, and is thickly coated with short hair. It is broad and rather flattened, evenly rounded over the dorsum. The margins of the carapace are pink or white, squarely scalloped, but not very well developed. The collar also is not as large as usual. Neither tubercles nor gland appear to be present. Length, 14 mm.

Pupa. Light reddish-brown dorsally, becoming darker on the wing-cases and thorax. In shape, elongate, tapering to the posterior extremity, with the thorax long and narrow. There is a fine dark dorsal line, and a black spot on either side of the junction of the thorax and abdominal segments, where there is a slight constriction. Surface hairy. Length, 8–9 mm. Placed in cracks of bark or under it.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, June, 1933.

46. *Uranothauma falkensteini* (Dew.) (29).

Plebeius falkensteini Dewitz, 1879, *N. Acta Acad. nat. Cur.* **41** (2) : 204, t. 25, f. 5.—*Cupido falkensteini* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 462, t. 73a.

Food-plant. The larvae feed on the young shoots of *Acacia abyssinica* Hochst. et Benth., Mimosaceae.

Egg. Not known.

Larva. The larva is olive-green with short thick golden hair, a dark dorsal line, and rows of dark diagonal lateral stripes. Collar rather long and pointed anteriorly. The dorsum is double-ridged, but not prominently so, the segments well defined and the margins slightly scalloped. The anal segments are not much flattened and are evenly rounded posteriorly. Tubercles are present, placed rather further forwards than usual and near the extreme edges. They are thick and white, the extremities being bulbous, carried on a thin stalk, and quite different from any other that has been bred here so far. The gland is placed above these in the centre, the orifice being small and narrow. Length, 12 mm.

Pupa. Brown, lighter on abdominal segments and hairy, with a dark dorsal line and dark lateral abdominal marks. Head-case blunt, not bilobed, thorax ridged with a slight depression behind it. The pupa is narrow, rather small, and somewhat pointed posteriorly. Length, 8 mm.

Parasites. Three species of *Anilastus* (Hymen., Ichneumonidae) and also a Tachinid were bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, January, 1934.

47. *Cacyreus lingeus* (Cr.) (26).

Papilio lingeus Cramer, 1781, *Pap. Exot.*, **4** : 176, pl. 379, f. F, G.—*Cupido lingeus* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 463, t. 73a.

Food-plant. The larva feeds on the flowers and seeds of *Coleus Forskohlii* (Willd.) Briq., *Coleus lactiflorus* Vatke., *Calamintha simensis* Benth., *Calamintha elgonensis* Bullock, Labiatae, and many other Labiates.

Egg. The egg is very small, greenish-white, and much flattened, with a large part of the central area depressed and darkened. It is laid on the immature flower-spikes, on the calices or among the flowers. Diameter, 0·25–0·5 mm.

Larva. The larva may be of almost any imaginable colour, green, purple,

maroon, brown, etc., according to the particular Labiate on which it is feeding, and is in fact one of the most wonderful examples of procrypsis among the LYCAENIDAE. To give only one case: On *Coleus lactiflorus*, it is bright green with the scalloped edges of the sides, the "teeth" of the dorsal ridge, and the anal segments rich bluish-purple, while the extreme points of the dorsal "teeth" are white. This merges completely with the coloration of the flower-spikes. The dorsal ridge is double, the dividing "valley" being broader anteriorly, collar small, and the whole very hairy. There is no sign of tubercles or gland. Length, 15 mm.

Pupa. The pupa is light brownish with minute black speckling and two black dorso-lateral stripes. It is narrow and of nearly equal width throughout. Head-case very broad and blunt, and thorax slightly ridged. The pupa is very hairy and the hair both in the larval and pupal stages seems to be a further advance in procrypsis, for the food-plants are also mostly hairy. Length, 9 mm.

Parasites. The Hymenoptera bred were three species of *Anilastus* (ICHNEUMONIDAE), and a species of *Tetrastichus* (CHALCIDIDAE).

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, August, 1929, and March, 1930.

48. *Castalius hintza* (Trim.) (21).

Lycaena hintza Trimen, 1864, *Trans. ent. Soc. Lond.*, (3) **2**: 177 (S. Afr.).—*Cupido hintza* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 466, t. 73b.

Food-plant. The larva feeds on the uppersides of the leaves of *Zizyphus jujuba* Lam., Rhamnaceae, attacking the outer cortex; it is coloured suitably for this mode of life.

Egg. The egg is white, circular, very much flattened, with a minute black central spot. Diameter, 0·5 mm. It is laid preferably on the undersides of the young leaves.

Larva. In colour, bright yellow-green, with fine yellow striation and a very fine double dorsal line reaching the anal extremity, but not quite to the head. The dorsum is evenly rounded, centrally broad, and tapering slightly to the extremities without any irregularities. It is somewhat similar to that of *Anthene lunulata* (Trim.) but broader. The anal segments are not perceptibly flattened, but carry both tubercles and gland. The former are short, fine, whitish structures placed half-way between the central dorsal line and the edges, and are exserted laterally at an acute angle to the vertical, disclosing small spiny rosettes at their extremities. The gland appears as a dirty whitish transverse line, and is placed centrally above the tubercles. Length, 16 mm.; breadth, 6 mm.

Pupa. The pupa is, unlike the larva, quite different to that from *A. lunulata* (Trim.), being of the normal blunt-ended type. It is dark brown, mottled heavily with black. The thorax is ridged, with a small depression between it and the abdominal segments both laterally and dorsally. It is slightly hairy, the hair, however, being visible only through a lens. Length, 10 mm.

Ants associated. Crematogaster (*Orthocrema*) *jeanneli* Sants.; a var. of the preceding; *Technomyrmex detorquens* Walker.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, July and September, 1933.

49. *Castalius cretosus* Btlr. (20).

Castalius cretosus Butler, 1876, *Ann. Mag. nat. Hist.* (4) **18**: 485 (Abyssinia).—*Cupido cretosus* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 467.

Food-plant. The larva feeds on the undersides of the leaves of *Zizyphus jujuba* Lam., Rhamnaceae, eating only the outer cortex and never through the

leaf. It is extremely hard to detect since the colour is exactly the same as that of the leaf, and it is always flattened against the surface.

Egg. The egg is very minute, circular, and much flattened, with no central indentation. It is pale yellow, and is laid singly on the under surfaces of the leaves.

Larva. The larva is broad and flattened, so much so that a cross-section would show much the same thickness from side to side. The extremities are rounded and very similar; the margins are scalloped and fringed with long pale-yellowish hair. Colour pale green with a narrow white dorsal line slightly raised above the general level. The tubercles are placed half-way between the edges and this central line. They are short thick structures without a rosette, and are exserted vertically. The gland, between and just above them, appears as a darker line across the dorsal ridge. Length, 15 mm.; width, 5 mm.

Pupa. The pupa is placed on the undersides of the leaves. It is dirty pinkish-brown with a few dark spots and streaks, and is slightly hairy. It is narrow, with thorax ridged, and with the usual waist between this and the abdominal segments. Length, 10 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, July, 1933.

50. *Azanus natalensis* (Trim.) (17).

Lycaena natalensis Trimen, 1906 : 79, pl. 6, f. 18, 18a (♂, ♀).—*Cupido natalensis* Aurivillius 1924 *in* Seitz *Macrolep. World*, **13** : 469, t. 73c.

Food-plant. The larva feeds on the young shoots of *Acacia abyssinica* Hochst. et Benth., Mimosaceae.

Egg. The egg is white, circular, and very flattened. Diameter, 0·75 mm. It is laid among the young shoots of the plant.

Larva. The larva is onisciform, and the ground-colour is very pale green. It has a modified double-ridged dorsum, the "teeth" of which are much flattened, leaving a dark green dorsal line between the ridges. Along the laterals are black, white-edged, diagonal stripes continuing in front round the collar. The latter is characteristic, being squarely pointed in front, the second segment also being somewhat swollen and hood-like. It is edged with white. The lateral "skirts" are pale yellow, heavy, and much broadened. The flattened anal segments are divided centrally by a broad dark green line, and half-way to the edge on either side are the tubercles, almost invisible in the light ground-colour and very minute. They are not apparently exsertile. Above them is a large gland. Length, 16 mm.

Pupa. The pupa is narrow and of nearly even width throughout, but tapering slightly to the rather pointed posterior extremity and to the head-case. The latter is square ended and prominent, and behind it are conspicuous "shoulders." The thorax is ridged and dorsally there is a depression between it and the abdominal segments. The surface is smooth and polished, coloured green or brown, with a dark dorso-abdominal line and rows of large black spots on the sides. In addition, there are a few black spots on the sides of the thorax. Length, 10–11 mm.

Ants associated. Cataulacus donisthorpei Sants.; *Engramma ilgi* For.

Parasites. The Hymenopteron *Tetrastichus sculpturatus* Waterst. (Chalcididae) as well as a Tachinid was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, April, 1933.

51. *Azanus jesous* (Guér.) (16).

Polyommatus jesous Guérin, 1847, *in* Lefeb. *Voy. Abyss.*, **6** : 383, pl. 11, f. 3, 4.—*Cupido jesous* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 469, t. 73d.

Food-plant. The larva feeds on the young shoots of *Acacia stenocarpa* Hochst., and *Acacia abyssinica* Hochst. et Benth., Mimosaceae.

Egg. The egg is very minute, circular, white, much flattened above. Diameter, 0·25 mm. Laid among the terminal leaflets.

Larva. A beautiful bright green of a shade exactly resembling the food-plant. The dorsum is double-ridged and bluntly "saw-toothed," there being a depressed reddish-orange dorsal line between the ridges. The collar is narrow, hairy posteriorly, and edged with black. Along the margins are fine black diagonal stripes, and the edges of the carapace are scalloped. The last pair of teeth of the dorsal ridge are much darker in colour, the last two lateral stripes being jet black, so that the whole forms a dark patch just above the anal segments. These latter are flattened and carry a gland situated at the anterior extremity of a broad dark green longitudinal stripe, with the two tubercles placed close together on either side and just below the gland. These are exserted vertically, but not vibrated, and are longish, and white with spiny terminal rosette. Length, 12 mm.

Pupa. The pupa is very small, brown or green, the abdominal segments being lighter in colour, and having two rows of black dorsal spots. It is narrow and elongate, with thorax ridged, and a distinct depression between this and the abdominal segments. Head-case prominent, protruding rather far anteriorly. The pupa is placed on a stem of the food-plant, or in a crack of the bark. Length, 8 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, July, 1933.

52. *Syntarucus telicanus plinius* (Fabr.) (25).

Papilio plinius Fabricius, 1793, *Ent. Syst.*, **3** (1) : 284.—*Cupido telicanus plinius* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13** : 470; *ibid., loc. cit.* **9** : t. 153b.

Food-plant. The larva feeds on *Indigofera arrecta* Hochst. et C. Rich.; *Indigofera subargentea* De Willd., Papilionaceae: lucerne and, no doubt, on many other leguminous plants. It is found among the flowers and seeds or on the young terminal shoots.

Egg. The egg is white, circular, and flattened, with a deep central depression. Diameter, about 0·5 mm. It is laid on the underside of the leaflets or in the nodes of the secondary shoots.

Larva. The larva is dark sepia-brown with lighter brown lateral striation; the skin is velvety. Along the dorsum is a broad, bluntly toothed double ridge, the segments being deeply incised and the space between the ridges broadening anteriorly. The latter is of the dark sepia ground-colour, while the points of the ridge are lighter. The collar is rather narrow, but moderately large, rounded in front with the margins slightly scalloped. The anal segments are almost triangular, with the tubercles carried about half-way along them and placed much closer to each other than is usual, being midway between the centre and the edges. They are comparatively very long, yellowish-white structures, and carry the largest terminal rosettes of any Lycaenid I have yet seen, consisting of spines of varying length, arranged perfectly symmetrically. The gland orifice appears as a small dark patch immediately above the tubercles. Length, 15 mm.

Pupa. The pupa is dull brown speckled with black, with a black dorsal

line and prominent black spots on either side in the depression between the thorax and abdominal segments. It is entirely normal in shape, narrow across the head-case, with slight thoracic shoulders, and from these gradually broadens to the centre of the abdominal segments. Length, 10 mm.

Parasites. The Hymenopteron *Tetrastichus sculpturatus* Waterst. (CHALCIDIDAE) was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, March, 1930; Kavirondo, Kakamega, June, 1931.

53. *Cosmolyce bacticus* (L.) (24).

Papilio bacticus Linnaeus, 1767, *Syst. Nat.* (ed. 12): 789.—*Cupido bacticus* Aurivillius, 1924, *in* Seitz *Macrolep. World*, **13**: 471.—Seitz, *in* Seitz *loc. cit.* **1**: 290, t. 77h.

Food-plant. The larva feeds on *Crotalaria cleomifolia* Welw. et Baker, *Crotalaria cephalotes* Stend., *Crotalaria glauca* Willd., Papilionaceae; *Sutherlandia frutescens*; garden peas and many other leguminous plants are also attacked. The larva is found on the flowers and seed pods of all the above.

Egg. Circular, greyish-white, and about 0·5 mm. in diameter. The top is flattened, and there is a minute dark central spot, but no other ornamentation is visible through an ordinary hand lens. It is laid singly among the flowers.

Larva. In the early stages the larva is dirty greyish-green ornamented with a dark grey dorsal line and a series of dark grey wavy diagonal stripes along the sides. Later it becomes lighter in colour, until in the final stage it is entirely light dull green with only a hint of the original markings. It is slightly hairy. In shape, typical of many allied species, with evenly rounded dorsum and distinct segments and no prominences of any kind. Like its allies, also, it has a habit of humping itself dorsally when disturbed, in the manner of a wood-louse about to curl up. Both tubercles and gland are present; the former, placed rather near the anal extremity and towards the margins, are very minute whitish structures. They are exserted vertically and are very short, with small terminal rosettes. The gland has a large narrow oval surface, centrally above the tubercles and visible to the naked eye. No ants were in attendance, but this is probably a coincidence, since they are common on this group of plants. Length, 18–20 mm.

Pupa. The pupa is placed horizontally along a leaf, among debris at the foot of the plant, or sometimes in a seed pod. It is light brown with a few black spots and streaks, the abdominal segments being lighter and having double rows of dorsal spots and a fine dorsal line. The abdominal segments are broad and bluntly rounded at the extremity, the thorax ridged dorsally and the head-case prominent; between the abdominal segments and the thorax is a slightly depressed area. Length, 11–12 mm.

Parasites. The Hymenopteron *Neotypus intermedius* Mocs. (ICHNEUMONIDAE) as well as a Tachinid was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, June and December, 1933.

54. *Cyclirius crawshayanus* (Auriv.) (23).

Cupido crawshayanus Aurivillius, 1925, *in* Seitz *Macrolep. World*, **13**: 473 (nom. nov.).—*Scolitantides crawshayi* Butler, 1899, *Proc. zool. Soc. Lond.*, **1899**: 422, pl. xxv, f. 2, 2a (Machakos, E. Afr.).

Food-plant. The larvae feed on the fleshy outer cortex of the main tap root of *Cynoglossum coeruleum* Hochst. et D.C., Boraginaceae, always below ground; they are attended by many species of ants.

Egg. The egg is laid on the stem or lower leaves, usually singly. It is white, circular, and very flattened, with a slight depression inside the rim, and a small, raised, black spot in the centre.

Larva. The larva is dirty yellowish-white and semi-translucent, as one would expect from a life in total darkness. The skin is waxy, the segments sharply incised and the collar slightly darker in colour. It is broad but with no marked dorsal ridge. The anal segments are shield-shaped, broad and heavy, and carry anteriorly a gland with large oval orifice, and below it on either side and rather close to one another and to the central line are two tubercles. These do not appear to be exsertile; they are visible to the naked eye as two small oval areas with dark edges which, when ants are present, are vibrated just inside the orifice, the movement appearing through a lens like the very rapid opening and closing of the shutters of a camera. Length, 15 mm.; width, 4 mm.

Pupa. Translucent yellowish-white, with a dark dorsal line. It is long and narrow, the abdominal segments being especially long. The head-case is prominent, the thorax short and sharply ridged, with a depression between it and the abdominal segments. The latter are flattened, broad and rounded posteriorly. Shoulders prominent, wing-cases transparent. It is placed among the roots of the food-plant. Length, 12 mm.

Ant associated. Monomorium (*Monomorium*) *minutum* Mayr, var. *pallipes* For.

Locality. Mt. Elgon.

55. *Euchrysops malathana* (Boisd.) (32).

Lycaena malathana Boisduval, 1833, *Faun. Madag.* : 25.—*Cupido malathana* Aurivillius, 1925, *in* Seitz *Macrolep. World*, **13** : 484, t. 73f.

Early stages : Farquharson, 1921, *Trans. ent. Soc. Lond.*, **1921** : 378–380 (larva and pupa, on *Canavalia*) (S. Nigeria).—Lamborn, 1913, *Trans. ent. Soc. Lond.*, **1913** : 488 (larva and larval habits).

Food-plant. The larva feeds in the flowers of *Vigna monophylla* Taub., a species of ground-pea, and is therefore as a rule completely hidden. Just below the flower-buds there are several large plant glands and these are very attractive to ants of many species; it is not surprising therefore that this species, as described below, possesses both tubercles and gland.

Egg. The egg is very minute, only about 0·25 mm. in diameter. It is pale green, circular, and very much flattened, the lateral edges being prettily fluted, while above it is smooth with a minute black central spot. It is laid separately or in two's and three's in the nodes of the flower-stalks, and fixed in position with a polished, translucent gum, coloured like mother-of-pearl. It is commoner to find 2 or 3 than a single egg in one place, and they are laid quite haphazard, the second often overlapping the first and sometimes almost covering it.

Larva. Dull green or brownish-green with a series of blurred brown diagonal stripes along the sides, and a narrow brownish dorsal line. The dorsum is broadly rounded and the carapace well developed with scalloped edges. The collar is small but adequate to cover the head, proximally rounded. At the posterior extremity, there is a much flattened oval area, darkened centrally, carrying tubercles at its outermost edge, and a gland, with semicircular orifice, centrally above them. The tubercles are rather long whitish structures with a terminal rosette; they are exserted vertically. Length 12 mm.

Pupa. The pupa is transparent yellowish-brown on the thorax and wing-cases, and opaque on the abdominal segments. Along the latter is a dark dorsal

line and double rows of minute black lateral spots. In shape, it is narrow, tapering to the posterior extremity, with the thorax ridged and a distinct "valley" between it and the abdominal segments. Head-case narrow, but protruding rather far in front. Length, 9 mm.

Parasites. The Hymenopteron *Itoplectis suada* Tosq. (ICHNEUMONIDAE) was bred.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, May, 1934.

56. *Euchrysops osiris* (Hpffr.) (31).

Lycaena osiris Hopffer, 1855, *MonBl. Akad. Wiss. Berl.*, **1855** : 642 (Mozambique).—*Cupido osiris* Aurivillius, 1925, *in* Seitz *Macrolep. World*, **13** : 484, t. 73h.

Food-plant. The larva eats the same small ground-pea as *E. malathana* (Boisd.), feeding on the flowers. This is rather an interesting species in that the larva and the imago are very similar to *E. malathana* (Boisd.) and the food-plant is the same. It is a much rarer species here and therefore it seems possible that it is associated with *E. malathana* (Boisd.) in Müllerian mimicry for purposes of protection.

Egg. The egg is the only stage in which there is much difference from the allied species. It is circular, greenish-white and flattened, with a very minute dark central spot. It is laid among the flowers, always singly, without the translucent gum of the other species, and is much larger, being 0·75 mm. in diameter.

Larva. Differs from that of *E. malathana* (Boisd.) in that it is slightly hairy and the skin roughened with whitish papillae. It is green, with blurred diagonal lateral stripes, and a red-purple dorsal line broadening anteriorly until segment 1, with the collar entirely of this colour. The dorsum is slightly ridged and corrugate, the segment divisions being deeply incised. The anal segments are flattened and rounded posteriorly, and carry both gland and tubercles, the area round them being slightly darker than the remainder. The gland is black and oval followed by a short black line; the tubercles are placed just at the extremities of this on either side, and about half-way to the edges of the carapace. They are very small, thin whitish structures with terminal rosettes consisting of a few hairs only, and are exserted vertically. Length, 15 mm.; breadth, 4 mm.

Pupa. Greyish-brown to dark brown. It has a narrow black dorsal line and sometimes also rows of black lateral spots. The abdominal segments are rather broad and bluntly pointed posteriorly. Thorax slightly ridged with the usual small dorsal depression. Head-case not prominent. Length, 12 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, August, 1931.

57. *Eicochrysops nandianus* (B.-B.) (22).

Chilades nandiana Bethune-Baker, 1906, *Ann. Mag. nat. Hist.* (7) **17** : 109.—*Cupido nandianus* Aurivillius, 1925, *in* Seitz *Macrolep. World*, **13** : 488.

Food-plant. The larva feeds among the seed-pods or on the leaves of a small weed which grows in grass-land.

Egg. Very pale green, circular and very flattened, with a small dark central spot. Diameter, about 0·25 mm. Laid on leaves and seed-pods, usually rather near the ground and somewhat indiscriminately. Every specimen of the plant will be found to carry 10–20 eggs. When ovipositing the female always rests with open wings, thus prominently displaying the bright red marginal

spots of the hind-wing. Since the plant grows on the ground only 7–8 in. high, lizards are probably the chief enemies, and the red aposematic marks are therefore no doubt for their benefit. This is an unusual position for oviposition, most other species preferring to lay with closed wings, relying on the procryptic underside for protection.

Larva. The larva is narrow and green with a broad dark dorsal line and white margins, the whole thickly covered with short hair. Anal extremity broadly rounded and collar well developed. The dorsum is curved but there is no ridge or other irregularity. Length, 9 mm.

Pupa. The pupa is placed horizontally along the stem of the plant. It is narrow and pale green, the abdominal segments being lighter, and with the head-case and thorax covered with rather long whitish hair. The wing-cases are smooth, rather longer than usual, reaching midway along the abdominal segments and ornamented posteriorly with a few black spots. There is a dark dorsal line and a row of black dorsal spots, and along the sides of the thorax three jet-black diagonal stripes, while in continuation from these along the sides are minute black dots, one to each segment. There is no waist between the thoracic and abdominal segments. Length, 7 mm.

Parasites. The Hymenopteron *Tetrastichus sculpturatus* Waterst. (CHALCIDIDAE) was bred.

Locality. Kenya: Trans Nzoia, August, 1933.

58. *Cupidopsis cissus* (Godt.) (30).

Polyommatus cissus Godart, 1823, *Enc. Méth.*, **9**: 683.—*Cupido cissus* Aurivillius, 1925, *in* Seitz *Macrolep. World*, **13**: 489, t. 74g.

Food-plant. Eriosema cordifolium Hochst., a species of ground-pea. The larva feeds in the seed-pods, boring into them and feeding on the immature seed.

Egg. The egg is larger than usual, white and completely flattened above. It is laid in the nodes among the immature flower spikes. Diameter, 0·75 mm.

Larva. The larva is green with triple dorsal lines, the central one being red-brown and the outer ones yellowish-green. It is thickly clothed with short whitish hair, and along the sides, above the edges of the carapace, are rows of small black spots. Very regular in shape with no prominences, the dorsum rounded and the reddish edges of the carapace slightly scalloped. Seen from above it is torpedo-shaped, posteriorly very pointed and much broader than usual in comparison with its length. There appear to be neither tubercles nor gland, nor have I seen ants on the food-plant. Length, 12 mm.; breadth, 5 mm.

Pupa. The pupa is green with a fine black dorsal line and fine white lines flanking it on either side. It is covered with white spiny hair. In shape, narrow, with sharply pointed posterior extremity, thorax slightly ridged and head-case blunt-ended. The wing-cases and central parts are smooth, polished, and immaculate. Length, 10 mm.

Locality. Mt. Elgon, 18 miles S.W. of Kitale, 6–7000 feet, November and December, 1929.

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